

## Note

# AVERTING ARMAGEDDON: PREVENTING NUCLEAR TERRORISM IN THE UNITED STATES\*

*It is difficult to swim in hydrochloric acid with your legs chopped off.*<sup>1</sup>

-Russian General Alexander Lebed

### I. INTRODUCTION

General Lebed's quote seems opaque, but the Russian explained himself by noting that dealing with difficult and fluid situations requires the ability to adapt.<sup>2</sup> The Cold War is over, but the dangers of nuclear attack have not disappeared. If the United States does not adapt, Lebed's comment could describe the impossibility of dealing with one of the greatest threats now facing the United States—nuclear terrorism.

When a senior Russian general describes his country's efforts to safeguard nuclear weapons and fissile materials from theft as "unsatisfactory,"<sup>3</sup> it is time to take notice. Since the collapse of the Soviet empire, the likelihood of a nuclear attack aimed at the United States has actually increased, and quite substantially.<sup>4</sup> That risk does not stem from nuclear war with Russia, China, or some other country. Rather, the risk is one of nuclear terrorism, with the

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\*The Author wishes to thank James Miller for his guidance and assistance in the preparation of this Note.

1. Brian Killen, *Russia's Lebed Gets Sweeping Chechnya Powers*, Reuter's World Serv., Aug. 14, 1996 (quoting Alexander Lebed), available in LEXIS, News Library, Reuwlid File.

2. *See id.*

3. A. M. Rosenthal, *Only a Matter of Time*, N.Y. TIMES, Nov. 22, 1996, at A31 (quoting Alexander Lebed).

4. This is not to say that chemical and biological attacks are of lesser concern. The risk of a chemical or biological weapons attack on the United States may actually be higher, but the focus here is on nuclear terror. For a discussion of the chemical and biological threat as it relates to nuclear weapons, see Steve Fetter, *Ballistic Missiles and Weapons of Mass Destruction*, INT'L SECURITY, Summer 1991, at 5, 26.

weapon itself "hand-delivered."<sup>5</sup> Instead of using missiles or bombers, terrorists could simply smuggle a nuclear weapon into the United States over land, by plane, or by boat. Author and defense expert James Dunnigan refers to the "suitcase from Allah," a terrorist-delivered nuclear weapon, as the ultimate nightmare.<sup>6</sup> The World Trade Center bombing was disturbing enough, but former nuclear weapons scientist Theodore B. Taylor has estimated that a device with a half-kiloton yield would be sufficient to knock both Trade Towers into the Hudson River.<sup>7</sup>

The threat of nuclear terrorism is often treated as high risk/low probability,<sup>8</sup> and thus is often ignored by both policymakers and the general public. However, several factors make the possibility of nuclear terrorism greater than ever. First, a confluence of state-sponsorship and growing boldness has made terrorists increasingly sophisticated and more likely to employ weapons of mass destruction.<sup>9</sup> Second, the technology and know-how involved in building a nuclear weapon have become readily available.<sup>10</sup> Third, the abysmal state of affairs in Russia and the proliferation of nuclear weapons to other countries have increased accessibility to fissile materials, operable weapons, and skilled personnel.<sup>11</sup> Finally, the potential anonymity of nuclear terrorism and the increasing number of nuclear-capable states have made the threat of retaliation less of a deterrent.<sup>12</sup>

The threat is growing and the United States seems to have few solutions. Consider this exchange from a 1993 Pentagon news conference:

[Reporter]: What is to prevent some country, a Ghadafi or some other crazy, from sticking a nuclear weapon in a container or the hold of a merchant ship? How do you possibly counter against that?

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5. Delivering a nuclear weapon by hand is both technically simpler than missile or bomb delivery and much more anonymous.

6. See JAMES DUNNIGAN & AUSTIN BAY, *A QUICK AND DIRTY GUIDE TO WAR* 41 (1996).

7. See JOHN MCPHEE, *THE CURVE OF BINDING ENERGY* 226 (1973) (quoting Theodore B. Taylor).

8. See Karl-Heinz Kamp, *An Overrated Nightmare*, BULL. OF THE ATOM. SCIENTISTS, July-Aug. 1996, at 30.

9. See discussion *infra* p. 110.

10. See discussion *infra* p. 92.

11. See discussion *infra* pp. 97, 102.

12. See discussion *infra* pp. 111, 128.

[Lieutenant General Barry] McCaffrey: We don't have the answers yet, but rest assured, that's one of our principal questions.<sup>13</sup>

In fact, there may be no ideal solution, but advances in technology, changes in policy, and a more aggressive posture can at least reduce the chances that the United States will fall victim to nuclear terrorists. Rebuilding a credible deterrent is among the best options. If the United States works to stem nuclear proliferation, secure Russia's stockpiles, craft a flexible deterrence policy, and develop new technologies to detect and trace nuclear materials, there may be a chance. Changes must be made, and fast, because the threat will only get worse as more countries develop nuclear weapons and more materials leak out of former Soviet Republics.<sup>14</sup>

## II. THE THREAT: WHO WOULD DO SUCH A THING?

Consider a fictional scenario to focus the problem. America wakes up to CNN reports that a low-yield nuclear device has been detonated in lower Manhattan. The World Trade Center, the Empire State Building, and Wall Street have been vaporized. The immediate death toll is well over a million, and more will die from radiation and fallout. A long-term increase in incidences of cancer will add to the carnage.

Analysis of the blast area and traces of fissile material reveal that the weapon was of Russian origin. Cooperation from duly concerned Moscow authorities reveals that the weapon was misappropriated from the Arzamas weapons laboratory. However, further investigation fails to reveal the thief (or perhaps buyer).

Several questions present themselves. First, who is responsible? Against whom does the United States retaliate, and in what fashion? Does the attacker have additional devices? Are more attacks forthcoming?

Then, there is the question of motive. Suppose that the perpetrator was Hizballah, acting on orders from Tehran. Consider that Iran and its terrorist proxy might seek to 1) rid the Middle East of Western cultural and political influences; 2) banish U.S. military assets from the region; 3) destroy Israel as a state (which would be

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13. Department of Defense News Briefing, conducted by Secretary of Defense Les Aspin, Assistant Secretary for Nuclear Security and Counterproliferation Ashton B. Carter, and Lieutenant General Barry McCaffrey, Director for Strategic Plans and Policy for the Joint Chiefs of Staff (Oct. 29, 1993) (transcript available from the Office of the Assistant Secretary of Defense (Public Affairs)).

14. See discussion *infra* pp. 100, 102.

easier if Israel's largest benefactor were wounded); or 4) curtail America's ability to interfere in Iran's economic, political or military expansion.<sup>15</sup> Because Iran lacks the capability to get its way by conventional means, it resorts to terror. But kidnappings, bombings and assassinations have not really solved Iran's problems, and war is not an option. Indeed, U.S. military performance in Desert Storm gave the mullahs nightmares, as it took the United States only six weeks to do what Iran could not accomplish in nine years of war with Baghdad.

Further, Iran does not fear retaliation, as the United States does not know who is responsible. Iran need not claim responsibility or issue threats in order to reap the reward of a hobbled America. Even it did, would the attack invite nuclear retaliation? Conventional force? Either would be difficult if Hizballah declared that it had nuclear devices hidden in other U.S. cities and was ready to use them in the event the United States moved against Iran.

So, before considering how terrorists can build or acquire nuclear weapons, the topic of terrorism itself must be addressed. More specifically, who might be likely to instigate an act of nuclear terror? The temptation to equate capabilities with intent must be avoided. Still, given the changing nature of terrorism and the recent activities of various groups, the prospects for nuclear terrorism are on the rise.

State sponsorship—in the form of equipment, funding, training and safe havens—provides a significant contribution to the sophistication of terrorist attacks. Currently, seven countries are listed by the U.S. State Department as sponsors of terrorism: Cuba, Iran, Iraq, Libya, North Korea, Sudan, and Syria.<sup>16</sup> Note that the overlap between terrorism sponsors and nuclear proliferators is quite strong. Of the above states, all but Cuba and Sudan are heavily involved in suspicious nuclear activity.<sup>17</sup> Given Castro's behavior during the Cuban Missile Crisis and Havana's current lack of a superpower sponsor, one might speculate that, had he adequate

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15. For a brief discussion of the Iranian perspective toward the United States, see SHAHRAM CHUBIN, *IRAN'S NATIONAL SECURITY POLICY* 3-6 (1994).

16. See COORDINATOR FOR COUNTERTERRORISM, U.S. DEP'T OF STATE, PUB. NO. 10321, *PATTERNS OF GLOBAL TERRORISM* 1995, at 23 (1996). As it turns out, East Germany and other Soviet Bloc countries were heavily involved in training terrorists for attacks against the West, but these operations were discontinued after the Berlin Wall fell in 1989. See COUNT DE MARENCHES & DAVID A. ANDELMAN, *THE FOURTH WORLD WAR* 187 (1992).

17. Or rather, no evidence of such programs in Cuba or Sudan is publicly known. See *discussion infra* p. 97.

resources, Castro might even now be engaged in a covert weapons program (if only to use as leverage with the United States in easing trade sanctions).<sup>18</sup>

Terrorist groups sponsored by these states are high on the list of likely nuclear users.<sup>19</sup> The first and most formidable obstacle in engaging in nuclear terror is the acquisition of fissile material or a working weapon. One possible route is for a nuclear-capable state to supply the weapon. Iran, for example, could produce a weapon, transfer it to Hizballah, and suggest delivery to Tel Aviv, Washington, or New York. Of course, Iranian operatives could conduct the delivery themselves, but the Iranian government might wish to distance itself from the attack. In the event the target country determines that the bomb was of Iranian origin, Tehran could claim it was stolen.

This scenario highlights an important component in the link between proliferation and state-sponsored terrorism—enmity toward the United States. Each of the aforementioned countries has reason to harbor ill will toward America. Iraq may seek revenge for the Gulf War,<sup>20</sup> as may Libya for the 1986 “Eldorado Canyon” bombing.<sup>21</sup> Iran has also skirmished with the U.S. military and sees the United States as a harmful influence in the Middle East.<sup>22</sup> Syria resents U.S. backing for Israel and the 1983 intervention in Lebanon.<sup>23</sup> North Korea (which may already be nuclear-capable)<sup>24</sup> certainly has not forgotten U.S. involvement in the war that divided Korea forty-three years ago, and sees America as the barrier between its forces and Seoul. Any one of these countries would benefit if the world’s only remaining superpower were crippled by a nuclear attack, and might even help to do it. Consider the following brief list of state-

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18. This is not farfetched, as Castro wanted to launch against the United States during the Cuban Missile Crisis, and such a plan seems to be working for North Korea. In addition, Cuba has failed to sign the Treaty of Tlateloco, which seeks to create a nuclear weapons-free zone in Latin America. See John R. Redick, *Latin America's Emerging Non-Proliferation Consensus*, ARMS CONTROL TODAY, Mar. 1994, at 3.

19. Terrorists who enjoy the backing of a proliferator are in a good position to pursue nuclear terror.

20. See, e.g., DUNNIGAN & BAY, *supra* note 6, at 62, 76.

21. See *id.* at 309. Libya is likely infuriated by stiff sanctions imposed by the United Nations in 1992 after Libya refused to turn over two of its intelligence officers who are suspected of bombing Pan Am Flight 103. See *id.*

22. See CHUBIN, *supra* note 15, at 3-6.

23. See DUNNIGAN & BAY, *supra* note 6, at 102, 117.

24. See discussion *infra* p. 100.

sponsored activities:<sup>25</sup>

*Iran:* Bombing of Beirut Marine barracks (1983), and U.S. embassy (1984); hostage-taking in Lebanon throughout the 1980s; death sentence (*fatwa*) issued against author Salman Rushdie;

*Iraq:* Attempt to assassinate former President George Bush (1993);

*Libya:* Bombings of Pan Am flight 103 (1988) and UTA flight 772 (1989);

*North Korea:* Assassination of four South Korean cabinet members in Rangoon bombing (1983); bombing of KAL aircraft (1987);

*Sudan:* Assassination attempt against Egyptian President Hosni Mubarak (1995); provision of training and safe havens for Abu Nidal Organization, Hizballah, HAMAS, and others; and

*Syria:* Safe haven for HAMAS, Japanese Red Army, Popular Front for the Liberation of Palestine-General Command, and others.<sup>26</sup>

These and other incidents indicate that sponsors of terrorism are not averse to mass murder and might not have any qualms about using weapons of mass destruction.<sup>27</sup> Indeed, these countries may see the United States and its allies as lacking resolve, given that many of the aforementioned incidents went unpunished.<sup>28</sup>

Given both state sponsorship and their own activities, many subnational actors could have access to the funds, technology, and know-how sufficient to build atomic weapons. Consider that the Aum Shinrikyo cult, which manufactured its own sarin,<sup>29</sup> had one billion dollars in assets and fifty thousand converts worldwide.<sup>30</sup> Terrorism experts would consider the Aum Shinrikyo attack significant as it relates to potential nuclear terrorism, because once

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25. Of course, the list of incidents is much more extensive. Those included are the most well known and best documented.

26. See generally COORDINATOR FOR COUNTERTERRORISM, *supra* note 16, at 23-28, 48-49.

27. Note that Iraq has used chemical weapons (nerve agents and mustard gas) against civilian targets already. For example, several Kurdish villages were hit in 1988. See DUNNIGAN & BAY, *supra* note 6, at 13.

28. See discussion on the changing nature of terror, *infra* p. 108.

29. Sarin is a G-series nerve agent (dispersed by aerosol and absorbed by the skin, eyes, and respiratory tract) that causes respiratory paralysis and death. See KATHLEEN C. BAILEY, DOOMSDAY WEAPONS IN THE HANDS OF MANY 54 (1991).

30. See William J. Broad, *Seismic Mystery in Australia: Quake, Meteor, or Nuclear Blast?*, N.Y. TIMES, Jan. 21, 1997, at C1.

an organization crosses the threshold into weapons of mass destruction, others are more likely to follow suit.<sup>31</sup> As terrorism authority Brian Jenkins noted, "[A]n incident of nuclear terrorism, perhaps even an alarming hoax, would almost certainly increase the probability of other terrorists going nuclear."<sup>32</sup>

Several organizations could be candidates for nuclear terrorism, many of which are Middle Eastern. Indeed, in the post-Cold War era, Middle Eastern actors are often portrayed as most likely to resort to nuclear weapons, in part due to the fatalistic views prevalent in fundamentalist Islam.<sup>33</sup>

The following groups were chosen for inclusion as examples because they are large, currently active, have a record of indiscriminate killing, and receive some sort of state sponsorship:

*Abu Nidal Organization (ANO)*: A splinter group of the Palestinian Liberation Organization founded by Abu Nidal, né Sabri al-Banna. With a list of some nine hundred victims and a record of mass killings, ANO boasts several hundred members, support from the Iraqi, Libyan, and Sudanese governments, and its targets include the United States.<sup>34</sup>

*The Bosnian Serbs*: Not a terrorist group *per se*, though they have a record of genocide. The Bosnian Serbs are angry at the United States for imposing the Dayton accords, helping to arrest war criminals, and stationing troops in Bosnia. In 1995, Bosnian Serb leader Radovan Karadzic paid \$6 million for what he thought was a nuclear weapon, with another \$60 million promised to the arms suppliers. Fortunately for everyone else, the nuclear weapon was a fake, but the incident proves that the Bosnian Serbs were (and perhaps still are) in the market for a nuclear weapon.<sup>35</sup>

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31. See Gavin Cameron, *Nuclear Terrorism: A Real Threat?*, 8 JANE'S INTELLIGENCE REV. 422, 425 (1996).

32. Brian Jenkins, *Will Terrorists Go Nuclear?*, in THE TERRORISM READER 350, 355 (Walter Laqueur & Yonah Alexander eds., 1987).

33. See DUNNIGAN & BAY, *supra* note 6, at 119. See also John F. Sopko, *The Changing Proliferation Threat*, FOREIGN POL'Y, Dec. 1996, at 3, 11 (noting that "[R]eligious . . . groups have become more aggressive in seeking to further their aims by using weapons that cause large-scale casualties."). Note that some fundamentalist groups of the Jewish, Christian, and Hindu faiths also have records of horrific and indiscriminate violence. However, most of the state sponsors are Middle Eastern, and a large proportion of terrorist organizations listed by the State Department are motivated by Islamic fundamentalism of one sort or another. See generally COORDINATOR FOR COUNTERTERRORISM, *supra* note 16, 41-67.

34. See generally COORDINATOR FOR COUNTERTERRORISM, *supra* note 16, at 41.

35. See Chris Hedges, *An Old Tale of Swindle Resurfaces in Bosnia*, N.Y. TIMES, Dec. 14, 1997, at A5.

**HAMAS:** Formed in 1987 in the cauldron of the Intifadah, HAMAS opposes reconciliation with Israel and has conducted numerous bombings and assassinations. With thousands of sympathizers and a sophisticated financial network which includes fundraising in the United States, aid from Iran, and contributions from wealthy individuals in Saudi Arabia, HAMAS could go nuclear.<sup>36</sup>

**Hizballah:** An Iranian backed and, indeed, controlled group of several thousand based in Lebanon,<sup>37</sup> Hizballah (which operates under numerous names to sow confusion) has an annual Tehran-supplied budget of \$80 million.<sup>38</sup> Hizballah is most infamous for the 1983 bombing of the U.S. Marine barracks in Beirut and the kidnapping of Westerners in Lebanon.<sup>39</sup> More recently, Hizballah is suspected in the 1994 truck bombing of the Jewish cultural center in Buenos Aires,<sup>40</sup> indicating the group has a wide reach.

Just because other terrorist groups do not show up on the State Department list does not mean additional threats are absent. One would suspect that a well-organized terrorist group, cell or splinter faction could escape the notice of Central Intelligence Agency (CIA) and other intelligence agencies. This would be especially true for an organization formed explicitly to conduct an act of nuclear terrorism. Perhaps the group would only surface once it had an operable device and was ready to strike.

Another possible initiator of nuclear terrorism could be a disgruntled Russian nationalist group, perhaps seeking revenge against the United States for its role in the collapse of the Soviet Empire, for helping the Mujahadin during the Afghan war, and for the United States' recent attempts to push the North Atlantic Treaty Organization (NATO) further eastward. Such a group might consist of members of the officer corps, who could easily have access to nuclear materials, weapons, and access codes.<sup>41</sup> Indeed, given that the Russian military is poorly paid, lacks adequate housing, and suffers low morale (in part due to the Chechnya fiasco),<sup>42</sup> the Russian

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36. See generally COORDINATOR FOR COUNTERTERRORISM, *supra* note 16, at 25, 46-47.

37. See generally *id.* at 48.

38. See Barton Gellman, *West Pursues Terror Camp's Possible Link to Saudi Bombing of U.S. Troops*, WASH. POST, Dec. 1, 1996, at A33.

39. See generally COORDINATOR FOR COUNTERTERRORISM, *supra* note 16, at 48.

40. See *id.* at 25.

41. See generally ANDREW & LESLIE COCKBURN, ONE POINT SAFE 32-46 (1997).

42. See generally *id.* Indeed, the Russian military is so strapped for cash that, in 1992,



officer corps seems likely to be full of unhappy individuals.

Domestic terrorism is also a distinct and growing possibility. The Oklahoma City bombing of 1995 killed 168 people.<sup>43</sup> The explosive was a crude device fabricated from a mixture of fertilizer and fuel oil,<sup>44</sup> and the terrorists do not appear to have been either very smart or very well organized. Consider what a better trained and funded group with the same disregard for life might accomplish. Elements of American militia groups have already been arrested for working with ricin toxin, *E. coli* bacteria, salmonella, bubonic plague, and nerve gas.<sup>45</sup> If any of these groups could get their hands on fissile materials (perhaps from civilian nuclear plants), then they might go nuclear. What better way to destabilize a meddling and authoritarian central government than by proving it cannot adequately protect its own citizenry, thereby undermining public confidence?

#### A. The Changing Nature of Terror

At first glance, the terrorist *modus operandi* of using violence to draw attention to a cause and gain sympathy for "the movement" would not seem to mesh with nuclear use. While the *threat* of nuclear attack is certainly an attention-getter, nuclear use would so horrify people that few would sympathize with the cause or seek to redress the alleged wrongs the terrorists were fighting. If, as Clausewitz maintained, war is the continuation of politics by other means,<sup>46</sup> then terrorists would be unlikely to go so far out of bounds as to leave politics behind. For example, the Irish Republican Army would not resort to atomic terror as it would never again be brought into political negotiations with London and would alienate most of its supporters in Northern Ireland, along with its fund-raising base in the United States.

Following this logic, terrorists might be divided into two subsets: the traditional Clausewitzian terrorists seeking political change, and the more extreme fanatics motivated by revenge, "end-is-near" syndrome, or frustration with the progress achieved by current levels

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General (and later Minister of Defense) Vladimir Rodionov turned his nuclear bomber unit into an international freight and charter service. See *id.* at 35.

43. See Jo Thomas, *After Two Years, Bombing Trial is Set to Begin*, N.Y. TIMES, Mar. 30, 1997, § 1, at 1.

44. See *id.*

45. See David E. Kaplan, *Terrorism's Next Wave*, U.S. NEWS & WORLD REP., Nov. 17, 1997, at 24, 26.

46. CARL VON CLAUSEWITZ, ON WAR 87 (Howard & Paret trans., 1984).

of violence. Indeed, terrorists who have been practicing their trade for a long time, confronted with a media-savvy population desensitized to violence, may see nuclear terrorism as the only way to keep the attention of a nation and achieve its goals.<sup>47</sup> This later subset of terrorism seems to be on the rise.<sup>48</sup> Nuclear weapons allow terrorists to go a step further: A terrorist with a nuclear weapon has a military capability equivalent to that of an advanced sovereign state.

The changing nature of terrorism is of particular concern when viewed in the nuclear context. A summary of terrorist activity from 1995, compiled by the U.S. State Department, indicates that the vast majority of recent incidents have gone unclaimed. The refrain "no one claimed responsibility for the attack" permeates the report, which includes over eighty entries.<sup>49</sup> In an April 1995 study on trends in terrorism, acting DDCI (Deputy Director Central Intelligence) William Studeman observed that

[T]hese groups . . . are even more dangerous in some ways than the traditional groups because they do not have a well-established organizational identity and they tend to decentralize and compartmentalize their activities. They also are capable of producing and using more sophisticated conventional weaponry as well as chemical and biological agents. They are less restrained. . . [and] appear disinclined to negotiate but, instead, seek to take revenge on the USA and other Western countries by inflicting heavy civilian casualties . . . .<sup>50</sup>

More chilling from the nuclear standpoint, the new terrorists "don't seem to care about establishing legitimacy but just want to strike a blow in anger and kill as many people as possible . . . . For them, the calculation of the right level of violence seems to have no upper bounds."<sup>51</sup>

Recent terrorist activity has borne this out. In the cases of the 1993 World Trade Center Bombing, the 1994 bombing of the Jewish Cultural Center in Buenos Aires, and the 1995 and 1996 attacks on U.S. military facilities in Saudi Arabia, no group claimed responsibility.<sup>52</sup> Each incident has been traced back to Middle Eastern organizations,<sup>53</sup> but in each case the perpetrators did not

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47. See Jenkins, *supra* note 32, at 354.

48. See discussion *infra* p. 111, 122-23.

49. See generally COORDINATOR FOR COUNTERTERRORISM, *supra* note 16, at 29-40.

50. Cameron, *supra* note 31, at 424.

51. *Id.*

52. See generally COORDINATOR FOR COUNTERTERRORISM, *supra* note 16, at 23-28.

53. See *id.*

seem interested in claiming credit, but rather with inflicting heavy casualties and a dose of chaos.

With nuclear capability, terrorists might wish to make some demands before inflicting harm. Four general demand schemes suggest themselves: (1) bringing down a leader or government, possibly for revenge purposes; (2) an independence or autonomy demand, which could involve Palestine, Chechnya, or some other enclave; (3) release of prisoners; and (4) the typical ransom demand.<sup>54</sup>

Some might say that the move from high explosives to nuclear weapons is a big stretch, but many groups have at least given it some thought.<sup>55</sup> In fact, terrorist threats on the nuclear front are not unknown. A German terrorist once said that, with a nuclear weapon, he could make the Chancellor of Germany dance on top of his desk in front of the television cameras.<sup>56</sup> Indeed, in 1977 several members of the Baader-Meinhof gang attacked a U.S. military base in Giessen, Germany in an attempt to abscond with tactical nuclear weapons.<sup>57</sup> In 1985, the Armenian Scientific Group warned that Turkey's largest cities would be destroyed by three low-yield nuclear devices.<sup>58</sup> While the threat's credibility was low, the group's intent may have been more serious. After all, some one million Armenians were the victims of Turkish genocide in the years after World War I.<sup>59</sup> It is not inconceivable that revenge-seeking Armenians would utilize weapons of mass destruction in (belated) retaliation.<sup>60</sup>

In another instance, a raid on the Italian Red Brigade group in 1984 turned up documents on the possibility of stealing a tactical nuclear weapon.<sup>61</sup> The same organization had kidnapped American General James Dozier and questioned him extensively on the location of nuclear weapons in Europe.<sup>62</sup> These and other groups understand that a nuclear weapon allows a subnational actor to do real damage to the United States. Indeed, a nuclear device detonated

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54. See John Peter Goss, *Is Nuclear Terrorism Plausible?—Responses*, in NUCLEAR TERRORISM 39, 42 (Paul Leventhal & Yonah Alexander eds., 1986).

55. To some groups, a nuclear weapon may just be a more powerful bomb.

56. See Jenkins, *supra* note 32, at 352.

57. See COCKBURN, *supra* note 41, at 1-6.

58. See Jenkins, *supra* note 32, at 352 (citing MARMARA (Istanbul), Jan. 14, 1985).

59. See *id.*

60. See *id.*

61. See Thomas D. Davies, *What Nuclear Means and Targets Might Terrorists Find Attractive?*, in NUCLEAR TERRORISM 54, 57 (Paul Leventhal & Yonah Alexander eds., 1986).

62. See *id.*

in Washington, D.C. or New York could cripple the country.<sup>63</sup> So nuclear use is on the terrorist option list. In order to strike, however, terrorists must be able to deliver their device to the target.

### B. Special Delivery—Getting the Bomb to the Target

Terrorists would have a wide variety of options for delivering an atomic device to the United States and into a target city. They could use a ship—perhaps a fishing trawler, a freighter or a yacht. They could come in overland from Mexico or Canada. They could use an aircraft or a helicopter. In fact, given the tidal wave of illegal immigrants and drugs flowing into the United States on a daily basis,<sup>64</sup> it is not inconceivable that a terrorist group could smuggle an atom bomb into the country, especially if it were shielded from detection. Indeed, a major obstacle in dealing with a threatened act of nuclear terror is finding the device.<sup>65</sup>

Security in the United States is less than stellar. America maintains 301 official ports of entry, and only ten thousand customs inspectors are assigned to cover those ports, which translates into about thirty inspectors per port.<sup>66</sup> None of these inspectors is presently trained or equipped to detect nuclear materials.<sup>67</sup> Complicating the problem, the volume of people and cargo entering the country is staggering. Each day, 1.25 million people enter the United States.<sup>68</sup> Given the sheer volume of traffic and the country's inability to stem illegal immigration, it is likely that terrorists could slip into the United States with little difficulty.<sup>69</sup> For example, convicted terrorist ringleader Sheik Abdel Rahman had no problems getting into the country despite the fact that he came in from Sudan and was on a CIA watchlist.<sup>70</sup>

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63. A well-timed attack on the District could incapacitate the American government and the military. A strike on New York would likely throw the world financial markets into unprecedented turmoil.

64. See GRAHAM T. ALLISON ET AL., *AVOIDING NUCLEAR ANARCHY* 66 n.34 (1996).

65. See Albert Carnesale, *Defenses Against New Nuclear Threats*, in *NEW NUCLEAR NATIONS* 196, 204 (Robert D. Blackwill & Albert Carnesale eds., 1993).

66. See ALLISON ET AL., *supra* note 64, at 65.

67. See *id.*

68. See *id.*

69. Alternatively, terrorists or state sponsors could use "sleepers" already in place and fully integrated into the local community. The sleeper functions as a normal member of the community, possibly for years, until called upon to engage in espionage or terrorist activity. See Susan M. Schreck, *The Accidental Terrorists: Excludable Aliens Who Slip Across U.S. Borders*, 23 GA. J. INT'L & COMP. L., 625, 639 (1993).

70. The problem is even harder if terrorists have forged identity documents.

Cargo is even more problematic. On any given day, 1.36 *billion* kilograms of cargo arrive from overseas by ship, with another 4.66 million kilograms by aircraft.<sup>71</sup> Less than five percent of that cargo is physically inspected, and even then the inspection takes place after the cargo has already arrived at a port in or near a major city.<sup>72</sup> If a nuclear bomb is on the docks in Miami, New York, or San Francisco, it is already too late. Worse, terrorists do not have to infiltrate at one of these official entry ports. Indeed, smart terrorists may not even bother using official channels of commerce. Perhaps the bomb could be broken down into its component parts and reassembled at the target. Terrorists might even use the United Parcel Service, Federal Express, or some other courier service.<sup>73</sup>

An example will serve to indicate just how easy it is to get a large quantity of material into the country. In June of 1995, seven *tons* of zirconium, a metal used to clad nuclear reactor fuel, were shipped from Ukraine to the United States, and from there the shipment was supposed to go to Iraq.<sup>74</sup> Five tons were subsequently discovered at a warehouse in Queens (the other two tons apparently "got away").<sup>75</sup>

Seven *tons* of contraband. A quantity of plutonium sufficient to build a crude atomic weapon would be about the size of an apple.<sup>76</sup> If customs cannot find plastic bags full of white powder with adequate frequency, will they be able to spot a piece of metal the size of an apple? Hidden amongst 1.36 billion kilos of cargo?

Screening for radiation will not be of much use. It is true that some materials can be detected at ranges up to three hundred feet, but only if they are "unshielded."<sup>77</sup> Any smart terrorist will use lead shielding<sup>78</sup> to foil detection. Highly enriched uranium (HEU)<sup>79</sup> is even harder to pick up, and even the most sophisticated passive

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71. See ALLISON ET AL, *supra* note 64, at 65.

72. See *id.*

73. See *id.* at 69.

74. See *id.* at 65.

75. See *id.*

76. See *id.* at 68.

77. See *id.* at 67.

78. See *id.* Shielding refers to cladding nuclear materials in lead or other heavy metals to prevent radioactivity (alpha, beta, or gamma particles) from escaping and either 1) harming people or 2) being detected by geiger counters or other radiation sensors. See *id.*

79. Bombs may not be efficiently crafted from the naturally occurring U-238 isotope. See Barry Kellman & David S. Gualtieri, *Barricading The Nuclear Window—A Legal Regime To Curtail Nuclear Smuggling*, 1996 U. ILL. L. REV. 667, 693 (1996). Uranium must therefore be enriched by separating out the scarce U-235 and increasing its overall ratio. HEU contains 20% or more of U-235. See *id.*

detectors only work from a few feet away.<sup>80</sup> With shielding, HEU will escape detection.<sup>81</sup> Active sensors which bombard HEU with radiation are more effective, but such detectors are dangerous to operate around humans and would be unsuitable at ports of entry for that reason.<sup>82</sup>

### III. THE THREAT: ACQUIRING THE BOMB

Consider another scenario. Suppose a terrorist group were to purchase weapons-grade uranium from the Sverdlovsk uranium enrichment and weapons assembly facility in Russia. People at Sverdlovsk have a going rate for each aspect of the transaction, having done this sort of thing before for some North Korean customers. Security is better since the facility received Nunn-Lugar<sup>83</sup> funding, but if the sale is an inside job run by people with access codes and knowledge of the security protocols, well, things do get lost in the shuffle. Why? Because the officials at Sverdlovsk are poor. They do not get paid regularly. When they do, the check is below subsistence levels. And they always ask where the bomb will be used. If the target is the United States, so much the better. Officers may blame the United States for the loss of their empire and their low standard of living.

The uranium, about the size of a baseball, is transported to a makeshift lab where a few unemployed Russian weapons designers help to build a crude fission device. The device is loaded on an old freighter which regularly carries cargo to San Francisco. U.S. intelligence has been following leaks from Sverdlovsk, but has been unable to trace fissile material thefts to the perpetrators; keeping track of Pacific rim ocean traffic, even with a sophisticated satellite system, is no easy task. Therefore, when the old freighter pulls up to port, it is not challenged by the Coast Guard. And then the package hidden away in the cargo hold goes off.

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80. See ALLISON ET AL, *supra* note 64, at 67.

81. See *id.*

82. See *id.*

83. The Nunn-Lugar legislation has allocated over \$1.5 billion to assist former Soviet republics in safely dismantling, transporting, and protecting nuclear weapons. See National Defense Authorization Act For Fiscal Year 1996, Pub. L. No. 104-106, §1201, 110 Stat. 186, 469 (1996).

## A. The Basics of Bomb Building

The critical component to any nuclear plot is the hardware.<sup>84</sup> Generally, either uranium (U-235) or plutonium (Pu-239) is required to fabricate a nuclear weapon.<sup>85</sup> The Natural Resources Defense Council recently estimated that a one-kiloton weapon could be fashioned from 2.5 to 8 kilograms of fissile material.<sup>86</sup> Indeed, a bomb could probably be constructed from just one kilogram;<sup>87</sup> if the goal is to build a radiological dispersion device,<sup>88</sup> even less material might do.<sup>89</sup> But a nuclear bomb with such a small fissile core is extremely sophisticated<sup>90</sup> and could only be fabricated by the United States or a comparably-equipped country.<sup>91</sup> For a less-advanced design, perhaps 15 to 25 kilograms would be needed.<sup>92</sup>

Enriched materials are not even required to build a nuclear weapon.<sup>93</sup> A bomb can be fashioned from reactor- (as opposed to weapons-) grade plutonium, though the task is more technically challenging.<sup>94</sup> Indeed, in 1962 the Department of Defense set off a 20 kiloton bomb made of reactor-grade plutonium to determine if such a feat were possible.<sup>95</sup> The United States and other important nuclear powers use weapons-grade material because it is reliable.<sup>96</sup> In

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84. See Kellman & Gualtieri, *supra* note 79, at 683.

85. Plutonium is the most efficient material used in nuclear weapons, as it has the lowest critical mass. Though Pu-239 is preferred, all plutonium isotopes are fissionable except plutonium which is more than 80% Pu-238. See *id.* at 683 n.49.

86. See David Hughes, *Uranium Seizures Heighten Terrorism Concerns*, AVIATION WK. & SPACE TECH., Apr. 3, 1995, at 63.

87. The quantity of material needed to achieve critical mass is largely dependent on how highly enriched the material is. For example, using uranium that was 20% enriched, a bomb maker would need about 250 kg. Using uranium that was 90% enriched, a bomb maker would need about 18 kg. See Kellman & Gualtieri, *supra* note 79, at 684.

88. A radiological dispersion device is a conventional bomb which is "larded with deadly radioactive shrapnel" that scatters across a wide area upon detonation. See Douglas Waller, *Nuclear Ninjas*, TIME, Jan. 8, 1996, at 38, 40.

89. See discussion *infra* Part III.F.

90. See Owen R. Coté, Jr., *A Primer on Fissile Materials and Nuclear Weapons Design*, in GRAHAM T. ALLISON ET AL., AVOIDING NUCLEAR ANARCHY 203, app. B, at 207 (1996).

91. Indeed, some of America's thermonuclear warheads use only nine pounds of plutonium. See *Id.*

92. See Hughes, *supra* note 86, at 63.

93. See Coté, *supra* note 90, at 217.

94. The Department of Defense classifies plutonium as supergrade (97% Pu-239), weapon grade (93% Pu-239), fuel grade (at least 80% Pu-239), and reactor grade (less than 80% Pu-239). See Kellman & Gualtieri, *supra* note 79, at 683 n.49.

95. See David Hughes, *When Terrorists Go Nuclear*, POPULAR MECHANICS, Jan. 1996, at 56, 58.

96. See Coté, *supra* note 90, at 205.

addition, much less of it is needed for critical mass,<sup>97</sup> which is an important characteristic when building ballistic missile warheads<sup>98</sup> with limited payload weights.<sup>99</sup> However, a terrorist with limited resources would probably not mind if his bomb is substantially heavier than bombs made with weapons-grade materials, or even if his bomb “fizzled,”<sup>100</sup> and thus yielded only a two-kiloton blast instead of twenty.<sup>101</sup>

One myth surrounding nuclear materials is that they are difficult to transport, because of their heavy weight and radioactivity.<sup>102</sup> However, this is not the case. The Hiroshima bomb, built over fifty years ago, used about one hundred pounds of highly-enriched uranium (HEU).<sup>103</sup> A more sophisticated weapon might require only forty pounds of HEU, or twenty pounds of plutonium.<sup>104</sup> Such low weights can be carried by a single person, and since uranium and plutonium are among the densest materials known to man,<sup>105</sup> the package would hardly be cumbersome. Indeed, 100 pounds of HEU would be about the size of a grapefruit.<sup>106</sup> In addition, radiation is not a big problem; Pu-239 only emits alpha particles, which cannot penetrate the skin,<sup>107</sup> while HEU is even less radioactive.<sup>108</sup>

Still, manpower is at issue. Carson Mark, former head of nuclear weapons development at Los Alamos,<sup>109</sup> believes that a dozen

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97. See *id.* at 206.

98. See Carey Sublette, MILNET-Nuclear Weapons, 4.2.6.1, 4.5.1.2. (last modified Oct. 23, 1996) <<http://www.onestep.com/milnet/nukeweap>>. This is an excellent web site for all aspects of nuclear weapons, including the science behind bomb building, current nuclear arsenal compositions and proliferation trends.

99. See *id.*

100. See ALLISON ET AL., *supra* note 64, at 61. A fizzle is akin to a dud, but whereas a dud fails to detonate altogether, a fizzle means that the nuclear device failed to perform at its predicted yield. Thus, a twenty-kiloton bomb that fizzled might only produce a two-kiloton blast, but is obviously still cause for concern. *Id.*

101. See Coté, *supra* note 90, at 217.

102. See ALLISON ET AL., *supra* note 64, at 12.

103. See *id.*

104. For example, the Nagasaki bomb contained 12 pounds of plutonium. See Coté, *supra* note 90, at 206.

105. Indeed, the U.S. military uses depleted (non-radioactive) uranium to armor tanks and for armor-piercing ammunition. See MIKE SPICK, MODERN ATTACK AIRCRAFT 87 (1987).

106. See ALLISON ET AL., *supra* note 64, at 1.

107. However, if ingested, plutonium is one of the most toxic of all substances. See Kellman & Gualtieri, *supra* note 79, at 683 n.49.

108. See ALLISON ET AL., *supra* note 64, at 12.

109. The Los Alamos nuclear weapons lab is in New Mexico. See 96 COLUM. L. REV. 1203, 1226 n.134 (1996).



specialists—including a nuclear physicist, a mechanical engineer, a chemist, an explosives expert, and a mathematician—could build a nuclear weapon in one year.<sup>110</sup> The scenario assumes that the group has an adequate supply of plutonium or highly enriched uranium. The specialists would need to be highly skilled, but not necessarily experienced in nuclear weapons design.<sup>111</sup> The process would probably be faster if actual weapons designers, from Russia perhaps, were employed.

Any nuclear weapons design team would have access to a tremendous amount of sophisticated equipment and information available on the open market.<sup>112</sup> Nuclear weapons are simply easier to build than they used to be.<sup>113</sup> The United States began the Manhattan Project<sup>114</sup> in 1942, over fifty years ago. Today, vast amounts of information on physics, chemistry, and engineering are available to the general population, and increasing numbers of students are learning about these subjects.<sup>115</sup>

On the positive side, a home-made terrorist weapon would probably be a simple fission bomb.<sup>116</sup> The much more destructive thermonuclear designs<sup>117</sup> are more difficult and expensive to construct.<sup>118</sup> Thermonuclear weapons require deuterium, tritium, and lithium deuteride to enable the fusion process which can produce explosive yields in the megaton range.<sup>119</sup> These isotopes are very difficult and expensive to create, do not travel well, and are hard to store (due to short half-lives).<sup>120</sup> Thermonuclear weapons are not beyond the capabilities of terrorists, but a simple twenty kiloton

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110. See Hughes, *supra* note 86.

111. See *id.* at 64.

112. See *id.*

113. See *id.*; see also KATHLEEN C. BAILEY, DOOMSDAY WEAPONS IN THE HANDS OF MANY 15 (1991) (explaining that nuclear weapons are easier to design today than in 1942 because of several factors, including the abundance of information regarding the nuclear U.S. program, the existence of several sources for equipment and materials, and the increased familiarity with nuclear technology from civil nuclear programs).

114. The Manhattan Project was the code name of America's atom bomb program during World War II. See M. Christina Ramirez, *The Balance of Interests Between National Security Controls and First-Amendment Interests in Academic Freedom*, 13 J.C. & U.L. 179, 198 n.156 (1986).

115. See *id.*

116. See Sublette, *supra* note 98, at 4.2.1, 4.2.6.2.

117. Thermonuclear weapons can produce explosive yields in the megaton range (one megaton equals one million tons of TNT ).

118. See Côté, *supra* note 90, at 208.

119. See *id.*

120. See Sublette, *supra* note 98, at 2.2.2.1, 2.2.2.2.

fission bomb is much easier and cheaper to construct.<sup>121</sup> However, as a compromise, terrorists could create a "boosted" fission weapon, which would use some of the elements involved in a thermonuclear design to increase the yield of a fission bomb.<sup>122</sup>

Some argue that nuclear weapons design is an arcane and esoteric art. If nuclear weapons are so easy to build, why is it that more countries do not have them? First, many countries could build nuclear weapons but have chosen not to, either because they did not want to take the big step into nuclear status, they were pressured by allies, or they decided that the U.S. nuclear umbrella was a cheaper alternative.<sup>123</sup> Argentina, Brazil, Sweden, Switzerland, South Korea and Taiwan all engaged in nuclear weapons programs at some point, but eventually gave up for one or more of the aforementioned reasons.<sup>124</sup> Japan, Germany, and most of Europe have the capacity to build bombs, but again choose not to.<sup>125</sup>

The hard part of nuclear weapons construction is not bomb building, but fissile-material enrichment.<sup>126</sup> Creating U-235 or Pu-239 from naturally occurring or reactor-grade materials requires a complicated and expensive enrichment process.<sup>127</sup> It is this process which has given countries like Iraq so much trouble.<sup>128</sup> If a country or terrorist group can acquire the fissile material, then the enrichment process is moot. But when a proliferator wants a completely indigenous, self-sustaining system with which to build a nuclear arsenal, the enrichment process is crucial and hard to develop in secret.<sup>129</sup> That is not to say that such a system is impossible; had Iraq not invaded Kuwait, it might well have several bombs right now. Indeed, Lieutenant General Hussein Kamel Majid, former head of Iraq's weapon procurement program, recently revealed that just before the Gulf War, Iraq initiated a crash program to manufacture a single nuclear weapon by the spring of 1991.<sup>130</sup> Iraq had a total of 45

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121. *See id.* at 4.2.6.2.

122. *See* Coté, *supra* note 90, at 208-11.

123. *See* BAILEY, *supra* note 113, at 33.

124. *See* Sublette, *supra* note 98, at 7.4.

125. *See id.* at 7.5.

126. *See id.* at 4.2.1.

127. U-235 is very rare in nature, while Pu-239 is not a naturally occurring isotope. *See* BAILEY, *supra* note 113, at 10. To get quantities sufficient for a bomb thus requires the enrichment of naturally occurring isotopes. *See* Coté, *supra* note 90, at 212.

128. *See* BAILEY, *supra* note 113, at 9-13.

129. *See id.* at 10-11.

130. *See* Sublette, *supra* note 98, at 7.4.3.

kilograms of weapons-grade uranium ready for processing, but the scheme was aborted due to the allied air campaign which began in January of 1991.<sup>131</sup>

Additionally, proliferators do not want to rush the construction of a single bomb and then try to use it. If the plot goes wrong, retaliation will be hard to deter.<sup>132</sup> A country that develops an indigenous nuclear program has a more ambiguous stance and deters military action by other countries (like the United States), which may be uncertain as to how advanced the program is and how many bombs have been or can be built. Officials in Washington may hesitate to bomb North Korean facilities partly for this reason.<sup>133</sup>

## B. Prolific Proliferation

Since the United States completed the Manhattan Project, other countries have struggled to develop their own atomic arsenals. Officially, only Russia, Britain, France, and China have been successful.<sup>134</sup> While Belarus, Ukraine, and Kazakhstan did inherit strategic and tactical nuclear assets following the dissolution of the Soviet empire, all of those assets have now supposedly been transferred back to Russia.<sup>135</sup>

The reality of nuclear proliferation is much more troubling. A thorough examination of proliferation illustrates just how far nuclear technology has spread. Further, proliferators themselves may supply bombs or fissile materials to terrorists either intentionally, through loss or theft, or by way of corrupt insiders.

On the positive side, several countries have at least temporarily abandoned the nuclear option.<sup>136</sup> Taiwan, Sweden, and South Korea have all pursued the nuclear option at one time or another, but their programs are now thought to be inactive.<sup>137</sup> South Africa successfully built seven nuclear weapons, but turned them over to the International Atomic Energy Agency (IAEA) in 1993 and

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131. *See id.*

132. If the target knows that the proliferator only had one operable weapon, and that weapon has been discovered or disabled, then no uncertainty exists about additional nuclear threats.

133. Bombing an operating nuclear plant also creates a risk of dispersing radioactive fallout.

134. *See Sublette, supra* note 98, at 7.2.1-7.2.5.

135. *See id.* at 7.2.6.

136. *See id.*

137. *See id.*

voluntarily dismantled the whole weapons project.<sup>138</sup> Brazil<sup>139</sup> and Argentina<sup>140</sup> have also apparently abandoned the quest for nuclear weapons,<sup>141</sup> while Operation Desert Storm supposedly crippled Iraq's bomb project.<sup>142</sup> Still, the list of nuclear powers is longer and more ambiguous than would seem at first.

India's nuclear capability has been known since May 18, 1974, when it detonated a fifteen kiloton bomb in the Rajasthan Desert.<sup>143</sup> India is now thought to have up to 100 nuclear weapons, which may include second-generation (thermonuclear) bombs.<sup>144</sup> Because India is not a signatory to the Nuclear Non-Proliferation Treaty (NPT)<sup>145</sup> (and is indeed a vociferous objector to the current nuclear regime), India's nuclear facilities and stockpiles are not subject to monitoring by the IAEA and are thus "unsafeguarded."<sup>146</sup>

Israel became nuclear capable in the late 1960s, though its own weapons development owes much to French assistance.<sup>147</sup> Israel is believed to have anywhere from one hundred to three hundred weapons,<sup>148</sup> probably including thermonuclear capability.<sup>149</sup>

On February 7, 1992, Pakistan's Foreign Minister, Shahryar Khan, told the *Washington Post* that his country had the components to assemble nuclear weapons.<sup>150</sup> In July of 1993, General Mirza Aslam Beg, former chief of staff of the Pakistani army, claimed that

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138. See Lewis A. Dunn, *New Nuclear Threats to U.S. Security*, in *NEW NUCLEAR NATIONS* 21, 37 (Robert D. Blackwill & Albert Carnesale eds., 1993).

139. See Sublette, *supra* note 98, at 7.4.2.

140. See *id.* at 7.4.1.

141. However, a 1995 report quoted Russian intelligence sources as saying that Brazil has resumed its weapons program. See *In Brief*, JANE'S DEF. WKLY., Vol. 23, No. 14, April 8, 1995, at 5.

142. See Sublette, *supra* note 98, at 7.4.3.

143. See *id.* at 7.3.1.

144. See Dunn, *supra* note 138, at 36.

145. The Nuclear-Non Proliferation Treaty stipulates that only the five recognized nuclear powers may have such weapons, but are obligated to move toward disarmament and assist other signatories with peaceful nuclear programs (i.e. power, medicine, or research). States receiving such assistance are obligated to undergo inspections by the International Atomic Energy Agency to ensure that nothing is being used for military purposes. See Treaty on the Non-Proliferation of Nuclear Weapons, July 1, 1968, 21 U.S.T. 483, 729 U.N.T.S. 161.

146. See *id.* at 7.1, 7.3.

147. See *id.* at 7.3.3.

148. See generally SEYMOUR HERSH, *THE SAMPSON OPTION* (1991) (stating that Israel possesses three hundred weapons); see Dunn, *supra* note 138 (supporting the lower tally).

149. See Dunn, *supra* note 138.

150. See R. Jeffrey Smith, *Pakistan Official Affirms Capacity for Nuclear Device; Foreign Minister Vows to Contain Technology*, WASH. POST, Feb. 7, 1992, at A1.

Pakistan had tested a nuclear device (probably a hydronuclear/zero-yield test<sup>151</sup>), and other officials have admitted that Pakistan has fabricated pits (the nuclear core of an atom bomb) for fission weapons.<sup>152</sup> Pakistan is suspected of having at least ten air-deliverable bombs.<sup>153</sup>

Iraq effectively outsmarted the IAEA for years by doing the unexpected.<sup>154</sup> The IAEA safeguards program was designed to monitor peaceful nuclear programs to ensure that no materials were diverted to weapons use.<sup>155</sup> As far as the IAEA could tell, Iraq was a model member of the regime in both compliance and cooperation.<sup>156</sup>

Thus, Iraq's program was thought by many to have been unjustly attacked in the 1981 Israeli air-strike on the Osirak nuclear facility.<sup>157</sup> Osirak was a declared facility under IAEA safeguard, making Israel the target of harsh international criticism.<sup>158</sup> However, the Israelis feared that a weapons program was in progress.<sup>159</sup> Unfortunately, the Osirak strike convinced the Iraqis of the need to better secure their weapons facilities, which were dispersed and moved underground.<sup>160</sup> The IAEA would then be even less likely to stumble on the hidden program, while Israel and others would be hard-pressed to destroy it.<sup>161</sup>

Unbeknownst to the IAEA, the Iraqis had developed a secret parallel program, separate from its declared and peaceful power and research operations. The Iraqi weapons project, undetected by the IAEA's limited intelligence capabilities, operated without any safeguards or monitoring of any kind. An examination of Iraq's weapons program conducted in the aftermath of Desert Storm

151. See Sublette, *supra* note 98, at 7.3.6.

152. See *id.*

153. See Dunn, *supra* note 138, at 36.

154. See Lawrence Sheinman, *Lessons From Post-War Iraq for the International Full-Scope Safeguards Regime*, ARMS CONTROL TODAY, April 1993, at 3, 4. IAEA safeguards are designed to catch states using declared fissile material for weapons purposes, not to ferret out separate undeclared sites. See *id.*

155. See Paul Doty & Steven Flank, *Arms Control for New Nuclear Nations*, in NEW NUCLEAR NATIONS 53, 54-55 (Robert D. Blackwill & Albert Carnesale eds., 1993).

156. See Sheinman, *supra* note 154, at 3-4.

157. See Dunn, *supra* note 138, at 23.

158. See SEYMOUR HERSH, THE SAMSON OPTION 9 (1991).

159. See *id.* at 10.

160. See Maurizio Zifferero, *The IAEA: Neutralizing Iraq's Nuclear Weapons Potential*, ARMS CONTROL TODAY, April 1993, at 8.

161. As of December 1997, Iraq continues to defy the United Nations and the IAEA by failing to cooperate with weapons inspectors.

indicated that the Iraqis were within one year of completing a working nuclear weapon, though of dubious safety and sophistication.<sup>162</sup>

North Korea acceded to the NPT in 1985, but failed to sign the IAEA safeguards arrangement until 1992. Even after having done so, Pyongyang refused access to two undeclared nuclear facilities and was criticized by the IAEA's Board of Governors. North Korea retaliated by threatening to withdraw from the NPT and has renewed that threat on several occasions. Though the North Koreans have severely restricted IAEA inspection efforts, intelligence indicates that they have enough material (somewhere between seven and thirty-three kilograms of plutonium) to produce between one to five weapons.<sup>163</sup> Further, eight thousand reactor rods now in a cooling pond at the Yongbyon complex could be reprocessed to yield enough material for an additional five weapons.<sup>164</sup> A March 1993 report in Germany's *Stern* magazine cited a KGB report which claimed that North Korea produced its first nuclear warhead in 1991, using fifty-six kilograms of plutonium smuggled out of Russia.<sup>165</sup> North Korea supposedly froze its weapons program in 1994, in exchange for fuel oil and new light-water reactors<sup>166</sup> to be supplied by South Korea. However, on November 15, 1996, Pyongyang declared it could no longer abide by the freeze because the U.S. and South Korea were "dragging their feet" on the new reactors.<sup>167</sup> The testimony of recent defectors from the North further supports the notion that North Korea is already a nuclear power.

Still more countries now seek the bomb. According to Lewis A. Dunn, former assistant director of the U.S. Arms Control and Disarmament Agency and ambassador to the 1985 NPT Review Conference, Algeria, Egypt, Libya, and Syria could have working

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162. On examining the Iraqi design, one U.N. inspector noted, "I wouldn't want to be around if it fell off the edge of this desk." Gary Milhollin, *Building Saddam Hussein's Bomb*, N.Y. TIMES, Mar. 8, 1992, (Magazine), at 32.

163. See Dunn, *supra* note 138, at 37.

164. The rods are now under IAEA supervision, but could be reprocessed if the IAEA is kicked out. See, e.g., Howard Diamond, *The Korea Deal: Advantage U.S.*, WASH. POST, Apr. 17, 1997, at A23.

165. See Seymour Hersh, *The Wild East*, ATLANTIC MONTHLY, June 1994, at 75.

166. Light-water reactors are supposedly much harder to use for the nefarious purpose of bomb-construction, though the task is not impossible. See Shim Jae Hoon, *Nuclear Test: Can Reactor Heal North-South Rift?*, FAR E. ECON. REV., Sept. 4, 1997, at 16.

167. *North Korea Warms on Freeze*, INT'L HERALD TRIB., Nov. 16-17, 1996, at 4.

nuclear devices by the turn of the century.<sup>168</sup>

While Libya only operates a ten-megawatt research reactor and has apparently made little progress toward a nuclear capability, Colonel Qaddafi has publicly stated an intent to build nuclear weapons.<sup>169</sup> Additionally, Libya is suspected of hiring nuclear experts from the former U.S.S.R., so progress may accelerate. The Colonel would also like to purchase a weapon. Indeed, he tried to buy one from China in 1970, and when denied Libya contributed millions of dollars to Pakistan's program in the hopes of sharing in the results.<sup>170</sup> Pakistan cut off the Libyans, but not before Qaddafi expedited Pakistan's purchase of four hundred tons of uranium oxide from Niger.<sup>171</sup> Colonel Qaddafi then turned to India, which refused, and was in turn punished when Libya cut off its seven million barrel per annum oil deliveries.<sup>172</sup>

Of all the proliferators, Iran is the most feared. Estimates vary, but Israeli Prime Minister Benjamin Netanyahu placed Iran between three and five years from nuclear weapons status,<sup>173</sup> and that estimate was made in 1996. Iran certainly has the capabilities. Aside from the skilled personnel hired from former Soviet republics, China,<sup>174</sup> and Pakistan (as discussed *infra*), Iran has the physical plant to build atomic weapons. Iran has its own uranium mine and processing plant at Sighand, a uranium enrichment research facility at Isfahan, and in just a few years will have several Russian and Chinese-built reactors in the 300 and 440 megawatt range at Bushehr and Darkubin.<sup>175</sup> Russia has also agreed to provide two thousand tons of uranium as well as assistance with the development of Iran's uranium mines, though the United States has successfully blocked the planned sale of a uranium-enrichment plant.<sup>176</sup>

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168. See Dunn, *supra* note 138, at 37.

169. See Sublette, *supra* note 98, at 7.3.

170. See Jeremiah Denton, *International Terrorism—The Nuclear Dimension*, in NUCLEAR TERRORISM 154 (Paul Leventhal & Yonah Alexander eds., 1986).

171. See *id.* at 154.

172. See *id.*

173. See BENJAMIN NETANYAHU, *FIGHTING TERRORISM* 121 (1995).

174. Indeed, in June of 1993 Iranian government sources confirmed that a Chinese nuclear engineer and two Iranian technicians were kidnapped from the city of Shiraz. The men are suspected of being involved in Iran's clandestine nuclear weapons program. The report indicates that at least one country, perhaps Israel or Iraq, is on the case. See *Iranian Nuclear Secrets Can Be Dangerous to Your Health*, TIME, July 4, 1994, at 12.

175. See NETANYAHU, *supra* note 173, at 122.

176. See Sublette, *supra* note 98, at 7.3.

Iran has also not been satisfied with its domestic assets. In 1992, Iran attempted to purchase weapons-grade uranium from the Ulba Metallurgical Plant in Kazakhstan, and continues to seek restricted materials on the black market.<sup>177</sup> Anyone doubting Iran's intent need only heed the words of then Vice President Sayed Ayatollah Mohajerani, who in 1992 declared that "we, the Muslims, must cooperate to produce an atomic bomb, regardless of UN efforts to prevent proliferation."<sup>178</sup>

Finally, a broader proliferation problem presents itself. The larger the nuclear "club," the greater the possibility that fissile material, critical technology, or even an operable warhead will fall into the wrong hands. Even the big five nuclear powers cannot be counted on to completely safeguard nuclear assets, as seen in Russia's case. But further problems may arise with states like Pakistan and Iraq, where corruption is rampant, safeguard systems are less than adequate, and experience with nuclear matters is limited. The new proliferators simply do not have the experience, resources or technology to create an American-style system which would ensure that all nuclear assets are safe from unauthorized sale or theft.<sup>179</sup>

### C. Loose Nukes—The U.S.S.R.'s Going-Out-of-Business Sale

Perhaps nuclear terrorists do not enjoy the benefits of state sponsorship. Perhaps they do not have access to fissile materials from poorly-guarded commercial sources. Perhaps they lack the expertise to fabricate a workable atomic device. There is another option: securing a Russian nuclear weapon. Russian security is the issue that has many experts asking when, not if, the United States will be attacked with an unconventionally-delivered nuclear weapon.<sup>180</sup>

First, a consideration of what is available is warranted. Russia's arsenal, while having been cut under the Intermediate Nuclear Force (INF) and Strategic Arms Reduction (START) treaties, is still quite formidable, and now numbers somewhere between fifteen and twenty five thousand weapons<sup>181</sup> spread amongst nearly one hundred

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177. See *id.* at 7.3; COCKBURN, *supra* note 41, at 174.

178. See Etel Solingen, *The Political Economy of Nuclear Restraint*, 19 INT'L SECURITY, 2, at 126, 152.

179. See generally Steven E. Miller, *Assistance to Newly Proliferating Nations*, in NEW NUCLEAR NATIONS 21, 37 (Robert D. Blackwill & Albert Carnesale eds., 1993), at 97.

180. See Rosenthal, *supra* note 3.

181. ALLISON ET AL, *supra* note 64, at 21. Russia maintains five types of Inter-Continental



storage sites throughout Russia.<sup>182</sup> Russia's fissile material stores include approximately two hundred tons of plutonium and between eight and twelve hundred tons of HEU.<sup>183</sup> The dismantling process mandated by START will increase the amount of fissile material in circulation. Indeed, six tons of plutonium and thirty tons of uranium will be removed from Russian warheads in the course of the next fifteen years.<sup>184</sup>

While the former Soviet Union's entire nuclear arsenal is now allegedly in Russia, several former Soviet republics maintain nuclear facilities of interest. There is a nuclear warhead plant at Kurchatov and a plutonium and uranium enrichment center at Krasnoyarsk-45, both in Kazakhstan.<sup>185</sup> Other sites exist in Uzbekistan, Tajikistan, and Ukraine. Altogether, Kazakhstan, Tajikistan, and Ukraine still account for 70 percent of the former Soviet Union's uranium stockpiles.<sup>186</sup>

Further, Russia maintains thirty-seven civil power reactors, Ukraine has fourteen, and Lithuania and Armenia each have two.<sup>187</sup> Most are poorly supervised and the Russian Ministry of Atomic Energy is grossly understaffed and under-funded.<sup>188</sup> The Russian Northern Fleet, a security risk harbored on the Kola peninsula, had its electricity cut off by the local power company for not paying its bills, even though the nuclear vessels need a constant flow of power to prevent overheating and meltdown.<sup>189</sup> Security is low and morale amongst the soldiers is poor at best. Desertions in the Russian military are common and the country currently faces a crisis because soldiers are not receiving regular paychecks. For example, in 1993 a Russian naval officer in Murmansk absconded with a 10-pound block of enriched uranium, which he was planning to sell. The officer had nothing more than a chain link fence and an ordinary locker standing

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Ballistic Missiles (ICBMs), ballistic and cruise missiles aboard submarines, as well as bombs and cruise missiles for air launch. Many sources quote lower figures, around 9,500, but that figure is solely for strategic assets, not including tactical weapons such as artillery shells, short-range missiles, mines, etc. See, e.g., Sublette, *supra* note 98, at 7.4.

182. See Sublette, *supra* note 98, at 7.4.

183. See ALLISON ET AL, *supra* note 64, at 21.

184. See *How to Steal an Atom Bomb*, THE ECONOMIST, June 5, 1993, at 15.

185. See Mark Galeotti, *Decline and Fall—Russian Bombs and Global Security*, 6 JANE'S INTELLIGENCE REVIEW 434 (1994).

186. See *id.* at 434.

187. See *id.*

188. See *id.*

189. See Cameron, *supra* note 31, at 422.

between himself and the uranium.<sup>190</sup>

Even more troubling, since Russia reabsorbed the Soviet arsenal by claiming weapons and material from Ukraine, Kazakhstan, and Belarus, there is a sixty to seventy percent overloading of Russian storage facilities and monitoring systems.<sup>191</sup> Confusion is rampant, and reports persist, though denied by the Russian Defense Ministry, that twenty-three warheads were lost from a depot in Komsomolsk-na-Amure in March of 1992.<sup>192</sup> The problem is exacerbated by the inadequacies of Russia's material protection, control and accounting system. The Russians simply do not have a good idea of how much nuclear material and weaponry they have, where it all is, and whether anything is missing.<sup>193</sup>

The scope of the problem is staggering. Seymour Hersh has reported that Russian intelligence officials provided their American counterparts with details of an April 1993 seizure by Russian agents of 60 kilograms of weapons grade uranium at Izhevsk.<sup>194</sup> In addition, in September of 1995, the CIA determined that enough highly enriched uranium to make a nuclear weapon had been stolen from a military base near Moscow.<sup>195</sup> In the process of investigating, the CIA and Russian authorities found that gyroscopes were missing from a recently dismantled ICBM. The gyroscopes were tracked down and seized from a shed at Amman Airport in Jordan, on their way to Iraq. However, the uranium was unrecovered, and another batch of gyroscopes was ultimately delivered to In al-Haytham, a missile lab outside Baghdad.<sup>196</sup> The German Federal Intelligence Service reported 169 incidents of nuclear smuggling in 1995, concluding that Iran (amongst other states) was "almost certainly interested in fissile material on the black market."<sup>197</sup>

Security in Russia itself is no better. In one incident, inspectors from the Russian Ministry of Defense found a battery of nuclear-equipped SS-25 mobile missiles completely abandoned—the guards

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190. See Malcolm Gray & William Lowther, *The Loose Nukes*, MACLEAN's, Apr. 22, 1996, at 24.

191. See Galeotti, *supra* note 185, at 436.

192. See *id.*

193. See ALLISON ET AL, *supra* note 64, at 80.

194. See Hersh, *supra* note 165, at 75.

195. See Gray & Lowther, *supra* note 190, at 24.

196. See *id.*

197. *Iran Trying to Buy Nuclear Material on Black Market—German Press Report*, BBC Summary of World Broadcasts, July 22, 1996, available in LEXIS, News Library, BBCSWB file.

and technicians had left their posts to search for food.<sup>198</sup> Still, the situation seems better than the opposite extreme, in which a Russian colonel told of the “smart aleck” in his missile regiment who figured out how to launch an ICBM without the proper launch codes.<sup>199</sup> More recently and most troubling, General Lebed has claimed that in a 1996 inventory of Russia’s Special Atomic Demolition Munitions (low-yield, man-portable nuclear bombs weighing about sixty pounds each and stored in suitcase-type containers) eighty-four were missing and unaccounted for.<sup>200</sup>

Additional anecdotal evidence supports the assertion that Russia does not have control over its nuclear infrastructure. In March of 1994, the Russian Federal Security Service reported to Boris Yeltsin that in the second half of 1993 it had logged nine hundred thefts from military and nuclear plants and seven hundred thefts of secret technology, most of which was conducted by insiders.<sup>201</sup> In October, through Operation Sapphire, the United States evacuated six hundred kilograms of highly enriched uranium from the Ust Kamenogorsk plant in Kazakhstan. The purchase was engineered to prevent the uranium from finding its way into unfriendly hands, as it was secured only by a padlock. When the shipment arrived in the United States, it was found to contain four percent more material than had been paid for by the United States.<sup>202</sup> In November of the same year, Czech police seized three kilograms of HEU (87.5% uranium-235, which is more highly enriched than the Hiroshima bomb) from black market smugglers.<sup>203</sup> In March of 1995, Ukrainian authorities seized six kilograms of U-235 from the Kiev apartment of two former Russian soldiers.<sup>204</sup> In February of 1996, Lithuanian authorities seized two hundred and twenty pounds of uranium from an armed gang.<sup>205</sup>

A 1991 incident highlights Russia’s security dilemma, especially the lack of loyalty in the officer corps. William Arkin, a nuclear weapons expert for Greenpeace, negotiated to purchase a nuclear

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198. See ALLISON ET AL, *supra* note 64, at 8.

199. See COCKBURN, *supra* note 41, at 246.

200. See *id.* at 251.

201. See Cameron, *supra* note 31, at 423.

202. See *id.* The transfer was done in a rather rapid fashion as Iran was aware of the stockpile and also was attempting to purchase it.

203. See Hughes, *supra* note 86, at 63.

204. See *id.*

205. See David Hoffman, *Russia’s Nuclear Sieve*, WASH. POST, Apr. 17, 1996, at A25.

warhead from a Russian officer assigned to guard a bunker in Alten-Grabow, located in the former East Germany.<sup>206</sup> The deal was set, a plan hatched to smuggle the bomb out of the poorly guarded bunker, and a price agreed upon. Arkin planned to put the warhead on display as a protest against nuclear weapons and lax security. However, the August 1991 coup attempt in Moscow triggered the removal of all ex-Soviet weapons out of Germany, so the deal was never completed.<sup>207</sup>

Despite the seriousness of the problem, Moscow has been very uncooperative in efforts to control the loose nukes. Russia's Minatom (Ministry of Atomic Energy), and its head, Victor Mikhailov, have been notorious both in lack of cooperation and in denying the very existence of a problem.<sup>208</sup> Russia's nuclear arsenal is a great source of pride and an important symbol of its remaining power. Admitting that Moscow has less than full control over the nuclear apparatus is an embarrassing reminder of Russia's fall from grace.

The former Soviet Union has problems not just with fissile materials, but with sensitive weapons-related items as well. In 1993, Lithuanian police were tipped off that something valuable and illegal was being stored in a bank in Vilnius. The police raided the bank and found four tons of beryllium.<sup>209</sup> Beryllium trade is controlled by international agreement because, amongst other things, it is used as a neutron reflector to boost the yield of nuclear warheads.<sup>210</sup> The beryllium found in Vilnius was traced back to the Institute of Physics and Power Engineering, located outside of Moscow. Apparently, members of the Russian mafia acquired the beryllium with a bogus requisition order. The beryllium was destined for Zurich, where a buyer (suspected to represent the North Korean government) was offering \$24 million for the lot.<sup>211</sup> Again, cooperation from Minatom has been poor, and Victor Mikhailov went so far as to deny that beryllium is a dual-use item or has anything to do with nuclear weapons.<sup>212</sup> Cooperation on the Russian side will have to improve drastically if this problem is to be alleviated. The Russian

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206. See Hersh, *supra* note 165, at 72.

207. See *id.*

208. See ALLISON ET AL, *supra* note 64, at 119.

209. See *60 Minutes: The Worst Nightmare* (CBS television broadcast, Sept. 20, 1995).

210. See Coté, *supra* note 90, at 212.

211. See *60 Minutes*, *supra* note 209.

212. See *id.*

government has recently discovered that eighty percent of its own nuclear facilities lack portal monitors—exit doors with built-in radiation detectors to prevent insider theft.<sup>213</sup> Simply put, Russia is a sieve, and it is possible that enough fissile material, and perhaps even operable weapons, have escaped the country to keep numerous terrorists occupied. In any event, the Russian situation creates a great deal of uncertainty about how much fissile material is in the wrong hands.

#### D. The Brain Drain: Weapons Designers for Hire

A companion issue to the loose nukes dilemma is commonly known as the brain drain—scientists and engineers in the fields of weapons design, missile technology, and nuclear physics formerly laboring for the Soviets are now out of work and looking for employment. Many are finding high-paying jobs in China, Pakistan, Iran, Iraq, Libya, and other states seeking to advance their own nuclear programs. Employing experienced weapons designers can shave a substantial amount off the total time needed to develop a functional nuclear weapon.

The brain drain problem is growing. A help-wanted ad for a Hong Kong weapons company recently appeared in the Middle East: "We have detailed files on hundreds of former Soviet Union experts in the field of rocket, missile, and nuclear weapons. These experts are willing to work in a country which needs their skills and can offer reasonable pay."<sup>214</sup>

North Korea recently tried to recruit a group of 64 Russian missile experts with offers of \$3,000 a month.<sup>215</sup> Given that the scientists and engineers were earning about \$20 per month in Russia, the offer was quite attractive. Fortunately, all 64 were arrested while attempting to board a plane bound for Pyongyang.<sup>216</sup>

Indeed, while the base wage in Russia for such scientists is around U.S. \$67 per month, Iran is offering upwards of \$5,000.<sup>217</sup> Scientists at Arzamas-16, a Russian nuclear weapons lab, staged a protest in 1993 over their lack of housing, health care, and regular

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213. See Jessica Stern, *Act Now To Prevent Nuclear Terror in the Future*, INT'L HERALD TRIB., Apr. 11, 1996, available in LEXIS, News Library, Non-US File.

214. CNN *Future Watch* (CNN cable television broadcast, Mar. 17, 1996).

215. See Hersh, *supra* note 165, at 76.

216. See *id.*

217. See Cameron, *supra* note 31, at 423.

paychecks.<sup>218</sup> In October of 1996, the director of Russia's Chelyabinsk-70 nuclear complex committed suicide because he was ashamed that his scientists were not even paid the \$50 monthly wage they were promised by the government.<sup>219</sup>

While the United States has provided funding through the Nunn-Lugar Act<sup>220</sup> to establish gainful employment for these experts, this sort of atomic public-works project cannot compete with the salaries being offered by Iran, Libya, and other proliferators. The Russian Federal Counter-Intelligence Service (formerly the KGB) claims that it has successfully monitored a "golden fund" of two to three thousand key nuclear weapons scientists. However, thousands more are equally knowledgeable and capable in their fields.<sup>221</sup> A recent CIA report concludes that Russian efforts to control the brain drain have collapsed.<sup>222</sup>

#### E. Shopping Wholesale—The Civilian Market

Access to the Russian market is one possibility, but terrorists and proliferators may have a better route. Some 260 commercial nuclear power plants are currently operating in the non-Western world, and each has the capacity to produce bomb-grade plutonium.<sup>223</sup> Security at facilities in the United States and Europe is poor; in developing countries, it is even worse.

The total amount of fissile material in circulation today is staggering. Some one thousand metric tons of plutonium are presently in existence, spread amongst military and civilian programs in 22 countries.<sup>224</sup> Another fifteen hundred tons of HEU is present in deployed or surplus weapons.<sup>225</sup> Given that many of those weapons (about 90%) are held by the United States and Russia, and a large quantity are scheduled to be dismantled, the quantity of fissile material in circulation will increase dramatically in the coming

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218. See Hersh, *supra* note 165, at 76.

219. See Rosenthal, *supra* note 3, at A19.

220. See National Defense Authorization Act for Fiscal Year 1996, Pub. L. No. 104-106, § 1201, 110 Stat. 186, 469 (1996).

221. See Galeotti, *supra* note 185, at 434.

222. See *id.*

223. See Louis Rene Beres, *On International Law and Nuclear Terrorism*, 24 GA. J. INT'L & COMP. L. 1, 13 (1994).

224. See Kellman & Gualtieri, *supra* note 79, at 684 n.55. Of that quantity, about 650 tons are in civilian hands.

225. See *id.*

years.<sup>226</sup> Further, by 2003, another 330 metric tons of reactor-grade plutonium, separated from spent fuel, will be available for use.<sup>227</sup>

The Clinton administration could complicate the situation. Over objections from his own arms control team, the President is set to follow Department of Energy recommendations that will allow plutonium from dismantled nuclear warheads to be used in civilian power plants.<sup>228</sup> The plan reverses a twenty-year-old policy designed to keep weapons-grade plutonium out of the civilian sector, a policy specifically intended to prevent plutonium from falling into the hands of terrorists and rogue states.<sup>229</sup> Ironically, as recently as 1993 the Clinton Administration stated, "the United States does not encourage the civil use of plutonium."<sup>230</sup>

While the proposed MOX (mixed oxide) plan is designed to mix weapons-grade material with highly radioactive waste to render it unusable by bomb builders,<sup>231</sup> fissile materials transferred to civilian plants need military-quality security. The policy is also expected to encourage the Russians to use plutonium from dismantled warheads in their own power plants, and it may revive Europe's faltering plutonium power industry.<sup>232</sup> Since such programs involve the transportation of fissile material and its use in non-military facilities, experts fear terrorists will have an easier time stealing plutonium.

#### F. A Messy Alternative: Radiological Weapons

Rather than detonate a nuclear device, terrorists could deploy a radiological weapon, which is cheaper and much less difficult from a technical perspective. A radiological weapon consists of radioactive material (cesium, strontium, etc.) which is either introduced into a water supply, delivered by an explosive device, or possibly dispersed through an air-handling system. Thus, a radiological threat (or a hoax) would be more credible than a nuclear bomb threat because it involves a smaller amount of nuclear material and is technologically less sophisticated. For a radiological device, weapons-grade

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226. *See id.*

227. *See id.*

228. *See* Peter Passell, *U.S. Set to Allow Reactors to Use Plutonium From Disarmed Bombs*, N.Y. TIMES, Nov. 22, 1996, at A1.

229. *See id.* at A22.

230. *Id.*

231. The fissile material is recoverable, but the process is difficult and quite dangerous given the blending with highly radioactive waste. *See id.*

232. *See* Passell, *supra* note 228, at A22.

materials are not needed, and indeed are undesirable due to their low levels of radioactivity.<sup>233</sup>

Depending on the concentration of radioactive material, a radiological attack could cause cancers, induce acute radiation poisoning, or result in widescale fatalities. A dozen kilograms of plutonium-oxide powder dispersed with explosives could conceivably kill fifty thousand.<sup>234</sup> A *Pravda* article claims that a small cylinder of strontium tied to a hand grenade would kill everything in a one-kilometer radius.<sup>235</sup> Terrorists are well aware of the utility of radiological materials—a kilo of cesium will fetch \$100,000 on the Russian black market.<sup>236</sup>

Radiological terrorists could go after office buildings (3.5 ounces of plutonium particles would be enough to kill everyone in a large building or factory<sup>237</sup>), densely populated urban areas, or concentrations of people at sporting events or similar venues. Alternatively, the contamination of food and water supplies could serve as an effective means for spreading radiation.<sup>238</sup>

Radiological warfare has already been toyed with. In November of 1995, Chechen guerrilla leader Shamyl Basayev informed Russia's NTV television that four cases of cesium had been hidden around Moscow. NTV found a case in Ismailovo Park containing thirty-two kilograms of cesium-137.<sup>239</sup> Russian authorities noted that the cesium was industrial in nature, used in X-ray equipment.<sup>240</sup> But such material could be mated to a conventional explosive to create poisonous fallout. In another incident, a Moscow businessman was recently killed when Russian Mafia operatives placed gamma-ray emitting pellets in his office.<sup>241</sup>

The United States also faces the threat of a radiological dispersion device (RDD). Following the 1993 World Trade Center bombing, FBI agents investigated a group of Iranians who were suspected of plotting to disperse radioactive material around

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233. See ALLISON ET AL, *supra* note 64, at 12.

234. See David Hughes, *When Terrorists Go Nuclear*, POPULAR MECHANICS, Jan. 1996, at 59.

235. See Alexei Bausin, *Radioactive Death Merchants*, RUSSIAN PRESS DIG., Apr. 26, 1996, available in LEXIS, News Library, Non-US File (citing PRAVDA, Apr. 17, 1996, at 1-2).

236. See 60 Minutes, *supra* note 209.

237. See Beres, *supra* note 223, at 27.

238. See *id.*

239. See Cameron, *supra* note 31, at 425.

240. See *id.*

241. See *id.*



Manhattan.<sup>242</sup> While the threat never materialized, the FBI took it seriously, given the amount of radiological material available on the Russian black market.

#### IV. THE THREAT: FEAR OF THE UNKNOWN

Monday, 0900. The President arrives at his desk in the Oval Office and settles in to read his daily intelligence briefing when his national security advisor bursts through the door, holding in his hand a fax just received on his private line from an unnamed group.

"Greetings. We demand that the United States remove all of its military forces, assets, and prepositioned matériel from the Middle East, including Kuwait, Bahrain, Saudi Arabia, Qatar, Iraq, Turkey, and the waters of the Persian Gulf. In addition, all military and financial aid to Israel must cease. We realize that this will take time, so enclosed please find a timetable for these events. We believe the schedule is reasonable.

"Failure to comply will result in the detonation of an atomic bomb in Washington, D.C. To show we are not bluffing, enclosed please find a schematic of our weapon. Failure to meet our demands will result in Armageddon."

The design turns out to be workable. United States intelligence is cognizant of the fact that enough material has leaked out of Russia to build several bombs, and Iran is thought to be close to its own capability. Pakistan, now under a less friendly regime, could also have been a supplier. The timetable is indeed "reasonable," but the first deadline, to remove all naval assets from the Gulf, is in a week's time.

The President and his team face numerous problems. If the threat is taken seriously, the White House must decide if it should go public. Going public would give the population a chance to evacuate the city, but could cause mass panic. At the same time, it might anger the terrorists and suggest unwillingness to meet their demands. A mad-dash evacuation might also encourage other terrorists to yank the American chain with threats of nuclear terror. Alternatively, the terrorists could lay low, wait for the citizens to return to their homes (maybe a few weeks after the evacuation), and then detonate the weapon.<sup>243</sup>

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242. See *FBI probed Iranian nuclear attack plan*, UPI, Feb. 19, 1996, available in LEXIS, News Library, UPI File.

243. Not unlike the 1980s strategy of reseeding targets, whereby a nuclear power would

On the other hand, the threat could be kept secret. With one week to either comply or locate and disable the bomb, the White House does have some room to maneuver. Since the terrorists were kind enough to reveal the target city, the Nuclear Emergency Search Team (NEST)<sup>244</sup> can be called in to search Washington. If the bomb is found in time, things can be kept quiet. If not, any surviving government officials will be in trouble for knowing and not warning the population. Even if the bomb is found, there is no guarantee that the terrorists do not have another (or cannot get another) and would not try again.

#### A. A Note on Threat Credibility and Terrorist Demands<sup>245</sup>

The Washington scenario highlights yet another serious problem facing policy makers: How can they determine if the threat is really credible? It is widely known that fissile materials and perhaps even operable warheads are in the wrong hands. Information on building atom bombs can be pulled off the internet,<sup>246</sup> and plenty of groups are motivated to attack the United States. Given these factors, terrorists might not even need a nuclear bomb to make a credible threat. Unless a terrorist makes a frivolous—and thus suspect—demand (for example, asking for only a few hundred thousand dollars), any threat should be taken seriously. How can decisionmakers determine if a threat is really credible?

Terrorists desirous of being taken seriously might provide a bomb schematic or other evidence of technical sophistication (as in the aforementioned scenario). They could furnish a small sample of the fissile material to a government agency or the press. If a stolen weapon is involved, they might supply the serial number or other identification. However, while each of these steps would give the threat more credibility, supplying such evidence would also provide clues that might be used to track down the terrorists. In that case, anyone involved in atomic terror would have to weigh the benefits of being taken seriously against the risk of revealing too

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launch a strike, wait a few weeks for the survivors to come out of their fallout shelters, and strike again, thereby making sure to kill *everyone*.

244. See discussion of NEST, *infra* p. 122.

245. The entire credibility discussion assumes terrorists are using nuclear bombs to make demands. A surprise attack as discussed in the New York scenario and suggested by the discussion of terrorism trends negates the credibility issue.

246. See, e.g., *First International Virtual Conference on Mad Science* (last modified March 25, 1996) <<http://www.fttech.net/%7Emadsite/index.shtml>>.

much.

Thus, credibility would be a central issue in addressing the nuclear menace. Failure to take a legitimate threat seriously could be catastrophic. The credibility issue harkens back to the debate within the U.S. government about conducting a demonstration explosion before dropping the bomb on Hiroshima.<sup>247</sup> Well-equipped terrorists might indeed use one of their bombs as a demonstration shot in some uninhabited or sparsely populated area. Panicking the general population also limits the government's room to maneuver, and demands may have to be met in order to avoid widespread chaos amongst the citizenry.

However, even if credibility is established, concessions by the threatened government are not automatic, as the scope of terrorist demands would likely be commensurate with the magnitude of the threat. In the Washington scenario, the demand of a U.S. pull-out from the Gulf and suspension of all aid to Israel would be a considerable price to pay. Such a concession would set a precedent for other blackmailers. Further, American security guarantees to its allies would no longer be credible, radically altering the balance of power around the world. Thus, the terrorists might find themselves forced to maintain the threat indefinitely to prevent a policy reversal.

## B. Deterrence Failure

The credibility of a terrorist threat from the technical end is one thing, but what about intent? Would a rogue state or subnational actor really execute an act of nuclear terror, knowing what the price would be? Is not an act of nuclear terror inherently suicidal? No, it is not. Nuclear terror can be anonymous. Even if the attack is claimed, retaliation may still be problematic. These and other factors make the threat of nuclear terror more likely, because the traditional deterrent of nuclear retaliation that kept the Soviets at bay may not apply to terrorists.

A generally accepted lesson of the Cold War is that the United States and the Soviet Union never exchanged nuclear salvos (at least once both sides had substantial arsenals) because of MAD doctrine. MAD (Mutually Assured Destruction) dictated that even if one country fired its weapons in a surprise attack, the opposing country

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247. Some U.S. officials believed that Japan would surrender after witnessing a mere test-site detonation of an atomic bomb.

would either be able to retaliate in time, or have enough of its arsenal survive the first strike to ensure that the attacker was wiped out. Thus, nuclear war was a no-win situation.

While experts may argue about the value of MAD and its role in history, what seems clear is that, for deterrence to work, one must know who the attacker is. As Joseph Nye has observed, "The logic of deterrence fails when there is no return address."<sup>248</sup>

Deterrence is problematic because the threat of retaliation must be absolutely credible. If a terrorist group detonates a nuclear weapon in New York and the authorities trace the bomb to the group, what sort of retaliation is credible (or justifiable)? Say the group is based in the Bekaa Valley. Should the United States nuke Lebanon? Perhaps the bomb was stolen from Iran. Should the United States nuke Iran? Maybe the Iranians provided the bomb, but claim it was stolen. Then what? Perhaps the Iranians supplied a bomb to be used against Iraq, but the subnational actor executing the attack decided to shift targets. Should a country which allows the theft of nuclear materials or weapons, either through inadequate security, corruption, or negligence be denied its nuclear arsenal and related capabilities? For example, if Iran cannot safeguard its nuclear weapons, should the United States take down its entire nuclear infrastructure? What about Russia, which easily falls into the same category?

One more element in the deterrence problem is that of the rational actor.<sup>249</sup> The MAD doctrine assumes that no one wants his own group, population, or country to be eradicated. But suppose that the perpetrator of nuclear terror is an Islamic fundamentalist regime in Iran, Iraq, Pakistan, or that a subnational group of similar bent is involved. Indeed, some members of such groups might even stay with the bomb until it goes off.

If a group has no fear of death, deterrence will not work. If a group believes that the coming dawn of a new century means "the end is near" and it must be helped along (as was true for Aum Shinrikyo), deterrence will not work. Dealing with actors who do not behave in a "rational" way increases the uncertainty factor inherent in nuclear terrorism.

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248. Joseph S. Nye, Jr., *Diplomatic Measures*, in *NEW NUCLEAR NATIONS* 83 (Robert D. Blackwill & Albert Carnesale eds., 1993).

249. See generally Michele A. Flournoy, *Implications for U.S. Military Strategy*, in *NEW NUCLEAR NATIONS*, 142 (Robert D. Blackwill & Albert Carnesale eds., 1993).

Rationality also influences perception, and perceptions about the credibility of a U.S. deterrent may not be as strong as one might think. For example, one could argue that Saddam Hussein did not believe the United States would come to the defense of Kuwait because of his understanding of Vietnam and the American public's aversion to heavy casualties.<sup>250</sup> More recent incidents in Somalia, Bosnia, Rwanda and Haiti could create some confusion as to American resolve and embolden terrorists.<sup>251</sup>

## V. COUNTERMEASURES

The perils of nuclear terror seem insurmountable, and one reason they are often ignored, at least in public, is that the threat is so substantial while potential solutions are difficult. However, the United States does have some options which can at least reduce the threat. Clearly, combating terrorism is a sensible route to pursue. The usual options of intelligence gathering, infiltrating terrorist groups, attacking training camps, pressuring state sponsors and cooperating with other countries are all generally valuable means of reducing the threat of nuclear attack. But the focus of this segment will be on efforts specific to the nuclear threat, which poses additional challenges to the United States above and beyond conventional terrorism.

### A. Intelligence

Intelligence is of critical importance in combating nuclear terror. The United States needs as much information as it can get. How much fissile material do proliferators have? How much can they get their hands on? Will they pass materials to sub-national actors? What about Russian supplies and weapons? Which terrorist groups have been trying to acquire nuclear weapons? Do stolen Russian warheads have adequate security lockouts, or can terrorists operate them at will? Are Russian officers amenable to selling warheads? Which officers, at which facilities? How much money would it take to buy a warhead? The access codes? Some surplus plutonium? These and other questions must be answered, so that when

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250. Again, world leaders look to U.S. actions as indicators of future resolve.

251. Consider another perception problem as it relates to nuclear terror: What if some terrorists or rogue states believe that Gulf War Syndrome was the result of Iraqi chemical or biological attacks, the U.S. government knew of those attacks, and failed to retaliate? While this reading of events may be inaccurate, it is not unrealistic, and terrorists could interpret the incident as a lack of resolve on the part of the United States.

Washington gets a nuclear threat, its credibility can be accurately assessed.

The CIA and FBI are hard at work on the issue,<sup>252</sup> but also involved is the Department of Energy's Z Division, based at the Lawrence Livermore Laboratory in California.<sup>253</sup> Z Division analysts handle the most sensitive nuclear proliferation intelligence available. Z Division has studied the link between the Russian Mafia and the nuclear black market, as well as the possibility that some Russian-controlled nuclear weapons held in Ukraine were appropriated by officers loyal to Kiev.<sup>254</sup>

Most importantly, there is the issue of deterrence. In the event of a nuclear detonation, tracing the bomb to its origin will require some good intelligence work. If the bomb cannot be traced, the United States cannot retaliate. If terrorists think (rightly or wrongly) that American intelligence capabilities are lacking, they will be more likely to strike, being less fearful of retaliation. Inadequate intelligence will severely handicap the United States in its efforts to deal with nuclear terror in a crisis situation!

## B. Covert Operations

The U.S. Congressional Research Service (CRS) has its own suggestions on how to deal with nuclear proliferation and the threat that a weapon might fall into terrorist hands. In its report, *Nuclear, Biological, Chemical Weapons Proliferation: Potential Military Countermeasures*, CRS suggests bribing, rehiring, or kidnapping scientists and engineers involved in nuclear weapons programs.<sup>255</sup> Further, military forces could "abscond" with nuclear weapons or weapons parts, or switch critical parts with defective ones. Exotic devices including sticky glue guns, aqueous aerosols, anti-traction lubricants, liquid metal embrittlement agents, and non-nuclear electromagnetic pulse weapons could be employed to disrupt or destroy a weapons program.<sup>256</sup> Needless to say, action of such sort could start a war, and the technologies suggested are far from perfected.

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252. The FBI now has a liaison office in Moscow to keep tabs on the nuclear black market. See Galeotti, *supra* note 185, at 434.

253. See Hersch, *supra* note 165, at 74.

254. See *id.* at 75.

255. See Barbara Starr, *Covert Proliferation Solutions Studied*, JANE'S DEF. WKLY., July 9, 1994, at 4.

256. See *id.*

Covert operations can indeed lead to war, especially if directed at a proliferator state's nuclear program. And doing so when a proliferator has managed to assemble a few weapons is very dangerous. Still, a conventional war far afield might be preferable to falling victim to nuclear terrorists. This line of reasoning was a factor in the decision to go to war against Iraq in 1991.

### C. Counterproliferation

Several legal regimes are in place to stem the spread of nuclear weapons to other countries. At the forefront is the NPT.<sup>257</sup> In effect since 1968, the NPT is designed to limit nuclear weapons status to the five original nuclear powers. The treaty governs the use of nuclear power for peaceful purposes and allows signatories to operate research reactors or power plants, with the requirement that declared facilities will be inspected by the IAEA to ensure material is not being diverted to weapons programs.<sup>258</sup>

The NPT has not proven very effective at restricting the spread of nuclear weapons. Several states, including Israel, Pakistan, South Africa, and India have proliferated outside the treaty regime, as none is an NPT signatory.<sup>259</sup> NPT regime members Iraq<sup>260</sup> and North Korea<sup>261</sup> have come very close to nuclear weapons status despite IAEA safeguards (and indeed North Korea probably has a few bombs stashed away). Other countries such as Iran are also NPT signatories, but pursue the development of nuclear weapons just the same.<sup>262</sup>

The NPT is riddled with problems. A two-tiered structure formalizes the status of the five original nuclear powers (United States, Russia, China, United Kingdom, France) while barring other countries from building nuclear weapons, thus robbing the treaty of

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257. The international community has erected an extensive architecture of treaties and implementation groups to stem proliferation, including the Physical Protection of Nuclear Materials Convention, Treaty of Tlateloco, Limited Test Ban Treaty, London Nuclear Suppliers Group, Coordinating Committee for Multilateral Export Controls, and the IAEA. See Paul Doty & Steven Flank, *Arms Control for New Nuclear Nations*, in *NEW NUCLEAR NATIONS* 53, 56 (Robert D. Blackwill & Albert Carnesale eds., 1993).

258. See Treaty on the Non-Proliferation of Nuclear Weapons, July 1, 1968, 21 U.S.T. 483, 729 U.N.T.S. 161.

259. South Africa is now within the NPT framework, having given up its weapons. See *id.* at 62-63.

260. See generally Sheinman, *supra* note 154.

261. See David E. Sanger, *North Korea, on Long Leash, Runs Circles Around Its Foes*, N.Y. TIMES, Mar. 20, 1994, § 4, at 1.

262. See COCKBURN, *supra* note 41, at 162, 174.

some of its legitimacy.<sup>263</sup> Furthermore, several key countries are not signatories.<sup>264</sup> Also, the NPT lacks significant enforcement powers as the IAEA is limited in its ability to inspect facilities.<sup>265</sup> Even Iraq, which is under considerable scrutiny in the wake of the Gulf War, has obstructed the IAEA on countless occasions.<sup>266</sup> So while the NPT has been indefinitely extended after a hectic 1995 Review Conference, few of its inadequacies have been addressed.

There is of course the option of more active counterproliferation, specifically direct military action.<sup>267</sup> But as noted in the covert operations discussion above, bombing nuclear facilities is likely to start a war. Such an occurrence might not be a real problem in Iran, for example, as the Iranians lack the means to effectively retaliate (at least to a Desert Storm-type air war). Military action against North Korea would be more problematic, however, as Pyongyang could send its troops south. There is also the issue of following up with ground forces, not to take territory, but to ensure that all the relevant facilities were adequately disabled and that no more remain hidden. The more advanced a country's nuclear program, the more targets would have to be destroyed—reactors, research labs, storage depots, and enrichment facilities.<sup>268</sup>

Military strikes are difficult, but might prove necessary, particularly if intelligence sources indicate a state-sponsored attack or weapons-handover is imminent. Furthermore, if the country in question is advanced to the degree that U.S. intelligence is unsure whether the target has an operable weapon, an attack is complicated by the risk that it could invite nuclear terrorism—the very event Washington seeks to avoid.<sup>269</sup>

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263. The NPT does obligate the nuclear club to make efforts toward total disarmament, and other countries often complain that they have not kept their end of the bargain. Even with the INF and START treaties, warhead totals remain high.

264. For example, as non-signatories Pakistan, India, Israel, Brazil, and Argentina have all developed or considered developing nuclear capabilities. See Doty & Flank, *supra* note 257, at 64-69.

265. See *id.* at 55.

266. See *id.* at 54.

267. Bombing nuclear facilities creates a whole new host of issues: finding the targets, hitting them with precision-guided munitions, penetrating underground bunkers, preventing the dispersal of radioactive materials, etc.

268. See Philip Zelickow, *Offensive Military Options*, in NEW NUCLEAR NATIONS 162, 167 (Robert D. Blackwill & Albert Carnesale eds., 1993).

269. See *id.* at 171.



#### D. Safeguarding Nuclear Facilities

In its *Report Of The International Task Force On Prevention Of Nuclear Terrorism*, the Nuclear Control Institute suggested several steps to ensure that terrorists would not be able to sabotage nuclear facilities or appropriate fissile materials.<sup>270</sup> The recommendations include authorizing guards to use deadly force, improving physical barriers and upgrading security, and developing reactor control technology to deter sabotage.<sup>271</sup> The recommendations are simple, but the nuclear power industry in the United States has balked at such advice due to the cost and inconvenience of upgrading security protocols. Facilities in other countries may be even less secure.

All nuclear facilities, whether they are U.S. power plants, Russian weapons laboratories, or the arsenals of proliferators, must be safeguarded against theft. Further, personnel involved with fissile materials and nuclear weapons must be reliable. This is not presently the case in Russia,<sup>272</sup> and one can imagine that personnel in other countries could succumb to bribery or blackmail. If the Clinton plan to transfer weapons grade plutonium to civilian facilities goes through, the risk will be even greater.

Consolidation of facilities is an effective means of reducing the risk of insider theft or sale. The Department of Energy has announced plans to reduce the number of fissile material production and storage facilities in the United States to three.<sup>273</sup> Russia needs to do the same. Russian stockpiles and production facilities are spread out over an enormous area. There are so many different sites that the system has been referred to as the "Russian Nuclear Archipelago."<sup>274</sup> A smaller number of centralized sites is easier to safeguard and depends upon a smaller number of guards, decreasing the risk of insider theft or sale.

#### E. Controlling Loose Nukes and Brain Drains

The United States has attempted to deal with the loose nukes and brain drain problems, most notably through the Nunn-Lugar legislation.<sup>275</sup> Nunn-Lugar provides some \$1.5 billion to assist former

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270. See Beres, *supra* note 223, at 16-17.

271. See *id.* at 16.

272. See discussion *supra* p. 124.

273. See *Department of Energy Briefing on Plutonium Production and Storage* (C-SPAN, Dec. 10, 1996).

274. Coté, *supra* note 90, at 177.

275. See Former Soviet Union Demilitarization Act of 1992, Pub. L. No. 102-484, 106 Stat. 2315

Soviet republics safely dismantle, transport, and protect nuclear warheads and materials.<sup>276</sup> Aside from the fact that the money is not enough to safeguard the old Soviet arsenal, it only applies to Russia, Ukraine, Belarus and Kazakhstan.<sup>277</sup> Other former republics, including Lithuania and Azerbaijan, maintain nuclear materials and technologies which remain unsafeguarded.<sup>278</sup> As for the brain drain, Nunn-Lugar money has gone to the International Science and Technology Center, a Moscow institute designed to put former nuclear scientists and weapons designers to work on non-military projects.<sup>279</sup> However, as noted previously, such make-work programs cannot compete with the paychecks being offered by proliferators.

Senators Nunn and Lugar have recently proposed follow-up legislation designed to halt the smuggling of nuclear weapons and materials from the former Soviet Union. The plan, with a suggested starting price of \$300 million, would attempt to prevent smuggling at four points: inside the former U.S.S.R., at the borders of the newly independent states, at the U.S. border, and at the probable target cities.<sup>280</sup> Under Nunn-Lugar, cooperative threat reduction continued with another \$300 million authorized in fiscal year 1996.<sup>281</sup> Five million dollars in funding has also been provided for training and equipping police and fire officials in the United States to deal with a nuclear, chemical, or radiological attack.<sup>282</sup>

Another solution to the loose nukes problem is the U.S. plan to purchase Russian fissile material. The United States has agreed to buy five hundred metric tons of Russian HEU over the next twenty years, at a purchase price of \$12 billion.<sup>283</sup> Every bit of weapons-grade material taken from Russia and placed in U.S. custody is material not available to terrorists. Indeed, the program should be accelerated, as twenty years is quite a long time. However, such

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(1992).

276. See Stern, *supra* note 213.

277. See *id.*

278. See Galeotti, *supra* note 185.

279. See ALLISON ET AL., *supra* note 64, at 90.

280. See *Lawmakers Call For Layered Defense Against Nuclear Terrorism*, Deutsche Presse-Agentur, June 25, 1996, available in LEXIS, News Library, Curnws File.

281. See National Defense Authorization Act For Fiscal Year 1996, Pub. L. No. 104-106, § 1201, 110 Stat. 186, 469 (1996).

282. See Antiterrorism and Effective Death Penalty Act of 1996, Pub. L. No. 104-132, § 819, 110 Stat. 1214, 1316 (1996).

283. See Richard A. Falkenrath, *The HEU Deal*, in GRAHAM T. ALLISON ET AL., *AVOIDING NUCLEAR ANARCHY* 229, app. C (1996).

programs cannot completely resolve the problem, as fissile materials are available elsewhere, and enough has already been smuggled out of Russia to cause concern.

#### F. Technology Options for Bomb Security

One way to prevent existing nuclear weapons from being misused lies in technological applications. Many nuclear weapons are equipped with permissive action links (PAL)—systems which prevent the weapon from being detonated without the proper access code.<sup>284</sup> Some PAL systems are more sophisticated, disabling the bomb if it is tampered with or if the wrong code is entered.<sup>285</sup> American weapons are often outfitted with environmental sensing devices (ESD), which prevent detonation unless the weapon has undergone the physical parameters associated with delivery.<sup>286</sup> For example, a missile warhead would not detonate unless it had experienced the acceleration and velocity of a launch.<sup>287</sup>

Unfortunately, not all nuclear weapons are equipped with PALs and ESDs. The Russians have been educated regarding technological protections through Nunn-Lugar funding,<sup>288</sup> but the United States should further insist that *all* Russian weapons have at least the PALs feature. And what about other countries? Some have suggested supplying these technologies to proliferators, especially those prone to instability and lacking procedures for the peaceful transfer of power.<sup>289</sup>

Weapons designers could take the protective process a step further. Outfitting nuclear weapons with auto-destruct systems could be used to safeguard nuclear arsenals, especially the Russian stockpile. Many types of landmines are designed with such a remote disabling system, as are satellite launch vehicles and missiles used on test ranges. Each warhead could be equipped with a system that enables a command authority to broadcast a signal to disable the weapon, so that if a bomb were illicitly sold or stolen it could be rendered inoperable. Such a system would necessitate the use of satellites to ensure that the bomb could be deactivated wherever it

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284. See Steven E. Miller, *Assistance to Newly Proliferating Nations*, in *NEW NUCLEAR NATIONS* 97, 117 (Robert D. Blackwill & Albert Carnesale eds., 1993).

285. See *id.*

286. See *id.* at 116.

287. See *id.*

288. See National Defense Authorization Act, *supra* note 281.

289. See *id.* at 117.

was taken. Terrorists familiar with the system might try to jam the disabling signal, necessitating countermeasures in the design of any auto-destruct mechanism.

Additionally, nuclear weapons could be equipped with Global Positioning System (GPS) beacons so that stolen items could be traced and recovered. The GPS system could be further mated to the auto-disable mechanism, so that an effort to deactivate the tracking system would disable the weapon, as would moving the weapon beyond a set radius from its designated storage facility. Again, the issue of jamming would be problematic, but if thieves or purchasers were not aware of the tracking feature, they might be taken by surprise.

Of course, even the inclusion of auto-destruct and tracking systems in every single nuclear weapon currently in existence will not entirely eliminate the threat, as a proliferator or sub-national actor could simply build a device without such features. Alternatively, the fissile material might be extracted and used in a home-made weapon. Still, eliminating the possibility that a stolen nuclear weapon could ever be used against its creator is a good idea.

## G. NEST

If rogue states and terrorist groups outsmart intelligence assets, then they must deal with the Nuclear Emergency Search Team (NEST). Since its inception in 1974, NEST has fielded some eighty threats of nuclear terrorism.<sup>290</sup> Fortunately, each threat has been a false alarm, but the team prepares for the day when the threat is real. NEST members periodically measure background radiation in major cities so that, in the event of a threat, the team can overfly the area and detect any fluctuations.<sup>291</sup>

Bob Kelly, current head of NEST at Los Alamos, discusses the problem facing his organization:

If I find a bomb, I want to be able to guess whether it will work or not. I'd like to be able to make radiation measurements and then make some sense out of the measurements. If it goes off—and God help us if it goes off—I want to make additional measurements of debris and find out what we have. One of the scariest things is if someone confronts you with one device, and now comes back and

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290. See STEPHEN BOWMAN, *WHEN THE EAGLE SCREAMS* 193 (1994).

291. See *id.* Unfortunately, a terrorist device is likely to be shielded, making detection by this method virtually impossible.

says he has five more. Do you want to believe him?<sup>292</sup>

Detection of a nuclear weapon is a difficult task. Former NEST leader Mahlon E. Gates observes, "If an improvised nuclear device were hidden in a large metropolitan city such as New York or Chicago, with no further information on its location, it would be next to impossible for NEST to find it within a limited period of time."<sup>293</sup>

But NEST faces additional problems. While funding is running at \$70 million per year (less than Hizballah's estimated annual budget), most of the members of the group are volunteers from nuclear weapons programs at Los Alamos, Lawrence Livermore, and other labs.<sup>294</sup> As America's nuclear weapons program has been cut in half following the end of the Cold War, many of the skilled scientists and engineers at these labs have moved to the private sector and are no longer available to NEST.<sup>295</sup> Furthermore, the field is so specialized that NEST is unable to rely on outside personnel or technologies, as they do not exist.

Still, NEST is a well-trained and equipped organization. Its agents operate a large fleet of specially-outfitted vans, helicopters, and aircraft to aid in the search for wayward atomic devices. NEST also has access to a large array of clothing and disguises. Indeed, team members often dress as tourists or businessmen, and conceal their radiation detectors in briefcases, backpacks, or laptop computers so as not to arouse suspicion.<sup>296</sup>

Once a nuclear bomb is discovered, NEST has several options for disabling it. Many NEST members are themselves nuclear weapons designers capable of deactivating a bomb, and the team works closely with specially-trained ordnance disposal experts from the Defense Department.<sup>297</sup> Demolition experts could use conventional explosives to destroy the bomb without setting off the physics package.<sup>298</sup> Alternatively, agents can pour liquid nitrogen over the device to freeze its electronics and delay detonation until the bomb can be disarmed.<sup>299</sup> This assumes that the bomb can be

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292. Gary Taubes, *Countering Nuclear Terrorism: Dwindling Capabilities?*, SCIENCE, Feb. 24, 1995, at 1096.

293. BOWMAN, *supra* note 290, at 193.

294. See David Hughes, *When Terrorists Go Nuclear*, POPULAR MECHANICS, Jan. 1996, at 59.

295. See Taubes, *supra* note 292, at 1096.

296. See Douglas Waller, *Nuclear Ninjas*, TIME, Jan. 8, 1996, at 38.

297. See Hughes, *supra* note 294, at 59.

298. See Waller, *supra* note 296, at 40.

299. See *id.*

discovered and disarmed in time. If not, efforts turn to tracing a detonated nuclear device back to its origin.

#### H. Tracing the Bomb to its Origin

The ability to trace a nuclear weapon, detonated or not, back to its point of origin could restore the aegis of deterrence. If potential attackers are aware that their handiwork can and will be traced, they might think twice due to fear of retaliation.<sup>300</sup> Even in the case of a stolen weapon, the United States could identify a country which lacked adequate controls on the security of its weapons.

Lawrence Livermore National Laboratory has begun studying how to determine the origin of a nuclear bomb after detonation to track unattributed terrorist attacks.<sup>301</sup> Despite the power of the atom, little matter is actually destroyed in an atomic explosion, meaning that traces of fissile material and bomb components will remain, though they may be difficult to reach in a radioactive environment.<sup>302</sup> NEST members or other experts can use special equipment to locate those fissile material fragments among the rubble. Once the fragments, possibly no bigger than dust particles, are recovered, they can be analyzed. Samples can be placed in a gamma-ray spectrometer, which identifies elements and isotopes.<sup>303</sup> The pit, or physics package, of a nuclear warhead is *mostly* plutonium or uranium, but other elements and isotopes will be present. Among them could be tritium, U-240, neptunium, americium, gadolinium, curium, and promethium.<sup>304</sup> The presence of these substances, and the ratios in which they are present, can indicate the source of the fissile material in a nuclear device. Some of the isotopes are impurities inherent in the enrichment process, indicating which enrichment process was involved, something else to provide clues. Other isotopes could indicate where the pre-enrichment fissile

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300. Retaliation and the MAD doctrine do assume rational actors. The retaliation doctrine is a concept of striking back in the event of being attacked, with the underlying concept that if an adversary expects retaliation, he might not attack in the first place. The fear is that some sub-national actors do not care if they are killed.

301. See Hughes, *supra* note 86, at 64.

302. See TOM CLANCY, *THE SUM OF ALL FEARS* 715 (1991). Tom Clancy has access to high level officials in the Pentagon and the military. His descriptions and depictions are widely regarded as accurate, and given the sensitive nature of the subject, this novel provides one of the best available accounts of how a terrorist bomb might be traced.

303. See *id.* at 756.

304. See *id.*

material in the bomb was mined.<sup>305</sup> Each of these traits is a clue to the bomb's origin.

The IAEA keeps detailed records of fissile material production runs and the exact ratios of elements and isotopes present in any given year's output.<sup>306</sup> But these records are only kept for those facilities under IAEA safeguard, which excludes the five official nuclear powers and nonsignatories to the NPT (i.e. Israel), as well as facilities operated in a covert manner, outside the scope of IAEA monitoring.<sup>307</sup> The United States supposedly keeps such records of its own fissile material output,<sup>308</sup> and it is likely that Britain and France do as well. Russian records may not be as good, and even if they are, the Russians may not want to share them in the aftermath of a terrorist incident, as the revelation that the United States was attacked with misappropriated Russian material would be enormously embarrassing to Moscow. Still, records from the United States and other countries can serve to narrow the gap by ruling out certain sources, and not all clues require access to such records. Again, scientists may be able to determine the geographical origin of fissile material by tracing impurities to particular uranium mines. The makeup of fissile material also indicates which enrichment process was involved, something else to provide clues.

Given all of the above, one way to trace nuclear weapons would be to tag fissile materials.<sup>309</sup> Just as conventional explosives can be marked with paper taggants or unique chemical combinations,<sup>310</sup> nuclear materials could be similarly modified by altering the ratios of isotopes so that a bomb was easily identifiable. A multilateral treaty with all nuclear weapons powers could mandate that each country use a particular ratio of isotopes so that nuclear weapons and fissile material outputs are easily identifiable.

But even if the experts are able to determine the bomb's origin, the question remains: Then what? The weapon's origin is certainly a valuable clue, but the perpetrators are still unidentified. Was the bomb stolen? Purchased? By whom? The cooperation of officials from suspected countries would be crucial to answer such questions.

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305. A somewhat theoretical proposition. Investigators would require data on whether and how uranium and other materials vary by geographic origin.

306. See Kellman & Gualtieri, *supra* note 79, at 706.

307. See *id.*

308. See CLANCY, *supra* note 302, at 756.

309. See Kellman & Gualtieri, *supra* note 79, at 679.

310. There has been movement to mandate inclusion of such markings in explosives.

Thus, while tracing a bomb to its manufacturer will certainly be helpful in aiding investigators and restoring deterrence, it will not in itself solve the problem presented.

## VI. THE FUTURE: PROSPECTS AND PRESCRIPTIONS

The threat of nuclear terrorism will grow as more countries develop nuclear weapons, more security lapses occur in the former Soviet Union, and more fissile material becomes available due to disarmament and expanded power programs. Stopping nuclear terror at the source is the best bet for safeguarding America, but the focus should extend to territorial security as well, so that a terrorist device can be intercepted at its delivery site.

### A. Counter-Terrorism: Hit the Sponsors

A firm counterterror policy will be a necessary part of any comprehensive effort to prevent nuclear terrorism. This means no negotiations with terrorists, no trading arms for hostages, and not allowing actions like embassy seizures to go unpunished. Punishment must be of a military nature. Economic sanctions do not send a strong enough message. Libya and Iran are subject to numerous sanctions which have yet to prevent them from sponsoring terror.

Punishing the sponsors would go a long way toward shutting down the more sophisticated terror organizations most likely to be interested in nuclear weapons. Syria holds sway over terrorist training camps in the Bekaa Valley (and the opium fields used to finance them).<sup>311</sup> Sudan provides safe haven to all sorts of groups.<sup>312</sup> Iran funds attacks against American targets.<sup>313</sup> Terrorism is an increasingly preferred way for America's enemies to lash out. Strong measures must be taken to reverse the trend.

### B. U.S. Security

Nuclear terrorism is in many ways as problematic a policy issue as is drug trafficking. The challenge is to keep quantities of material and the people associated with that material out of the country. For nuclear terrorism, however, the stakes are higher. If one shipment of

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311. See generally COORDINATOR FOR COUNTERTERRORISM, *supra* note 16, at 28.

312. See generally *id.* at 27.

313. Saudi Arabia has presented strong evidence that Iran was behind the Khobar Towers attack on U.S. forces in Dhahran. See R. Jeffrey Smith, *Saudis Offer Evidence of Iran Terror*, INT'L HERALD TRIB., Dec. 12, 1996, at 2, available in LEXIS, World Library, IHT File.



cocaine reaches its distributor, the ramifications are not so serious. If a piece of plutonium the size of a baseball makes it to bomb builders in New York, the consequences could be dire indeed. The challenge is to find nuclear materials before they reach their targets, and do so in a way that overcomes American failures on the drug and immigration fronts.

Technology may save the day, but Washington must focus on the right solutions. For example, the U.S. Customs Service has plans to provide 1,500 inspectors posted at entry ports and international airports with pager-sized gamma ray detectors.<sup>314</sup> Though the devices would be good for detecting radiological devices and weapons made with irradiated reactor-grade materials, weapons-grade material is not very radioactive. Therefore, shielding should be able to defeat the detectors, which given their small size are probably not very powerful anyway.

Better advances will be required. An ideal solution would be a satellite-based system, which can monitor the entire country to detect warheads and fissile materials. While such a system can presently work for exposed and highly radioactive sources in generally specific locations, low-emission and shielded materials are still problematic.<sup>315</sup> It might be helpful to develop a detector which could differentiate between heavy metals such as lead, steel, beryllium, uranium, and plutonium.<sup>316</sup>

Another idea would be to follow Moscow's lead and install radiation detectors at key points throughout major cities.<sup>317</sup> While shielding would remain a problem, such a system might catch terrorists while they are assembling a bomb, arming it, or otherwise interacting with an unshielded device. What the United States needs to be working on is a system which will detect a nuclear weapon from considerable distances despite shielding. Whether the detectors focus on radiation, isotope concentrations, heavy-metal densities, or the presence of high-explosives, an effective bomb detector would be an invaluable tool in the fight against nuclear terror.

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314. See *Customs Inspectors To Get Devices To Find Radioactivity*, ORLANDO SENTINEL, Oct. 6, 1996, at A26, available in LEXIS, News Library, Orsent File.

315. See discussion *supra* p. 115.

316. A heavy-metal detector might allow NEST to find a bomb in an urban environment, perhaps even by detecting lead shielding. However, such a detector would have to be sophisticated enough not to be confused by the high metal content of buildings, sewer systems, and other urban structures.

317. See Cameron, *supra* note 31, at 425.

Finally, implementation of security protocols for protecting the population should be reviewed. Evacuating target cities creates its own problems, as discussed previously.<sup>318</sup> If the terrorists are not considerate enough to name the target, does the United States evacuate several cities? Which ones? How many? Also, while NEST can find a bomb discretely, NEST's failure to find a weapon is not proof that the weapon is not present.

### C. More Proliferation: The Expanding Nuclear Club

Proliferation is a major factor in nuclear terrorism. Each country with a nuclear arsenal is a potential supplier to terrorists. A bomb can be stolen, sold by corrupt officials, transferred to terrorists by a central authority, or lost in transit. If a nuclear-capable state has research labs, reactors, and enrichment facilities, then fissile material is subject to the same risks. So the more countries that have nuclear weapons or weapons development programs, the more likely that terrorists are going to get their hands on fissile material or even a working weapon. In addition, most proliferators will not have the security measures, such as PALs, and the relatively loyal personnel one finds in the United States, Britain, or France.

As of December 1997, nine countries have nuclear capabilities: the United States, Russia, Britain, France, China, Israel, India, Pakistan, and North Korea.<sup>319</sup>

Moreover, at least a dozen other states, like Japan, could easily produce nuclear weapons if they so desired.<sup>320</sup> Indeed, Japan is often said to be "a screwdriver away" from nuclear weapons capability, meaning that it has all the component parts, fissile material, and experienced manpower to build a bomb on short notice.<sup>321</sup> In fact, thanks to its breeder reactors, Japan will have enough plutonium by the year 2000 to manufacture 10,000 nuclear weapons.<sup>322</sup> Thus, the number of states that could serve as sources of fissile material or

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318. See discussion *supra* p. 133.

319. Some may quibble about North Korea's nuclear capabilities, but evidence strongly indicates that North Korea has a few bombs, or could put one together on short notice. See Sublette, *supra* note 98, at 7.3.5. In any event, inclusion of North Korea on the 1997 list is not critical to the argument.

320. Examples include Belgium, Canada, Germany, Italy, the Netherlands, Norway, Sweden, and Switzerland. See KATHLEEN C. BAILEY, *DOOMSDAY WEAPONS IN THE HANDS OF MANY: THE ARMS CONTROL CHALLENGE OF THE 90s* 30 (1991).

321. See *Japan to "Go Nuclear" in Asian Arms Race*, SUNDAY TIMES, Jan. 30, 1994, available in LEXIS, Europe Library, Ttimes File.

322. See Sublette, *supra* note 98, at 7.5.5.

bomb components is actually larger than a mere listing of nuclear capable states would indicate.

So what is the best case scenario for proliferation? India and Pakistan are convinced to disarm. A comprehensive and all-inclusive Middle East peace package leads to Israeli disarmament in exchange for a proliferation shutdown in all Middle-Eastern states pursuing the bomb. North Korea unites with the South and is no longer a threat. START II is fully implemented, bringing the United States and Russia down to about 3,500 warheads each.<sup>323</sup> The nuclear club is reduced to five, each with a relatively small and easily-secured arsenal, and a large portion of the warheads in each stockpile are at sea aboard submarines—about the safest place for nuclear weapons.

But this best-case scenario is not very likely. India and Pakistan show little sign of trusting each other. Indeed, the two almost traded nuclear blows in 1990 after an Indian Army exercise spooked Islamabad, which loaded some F-16s with nuclear bombs “just in case.”<sup>324</sup> A comprehensive Middle East nuclear agreement would have to include Iran as well as the other states, which is unlikely. The two Koreas could unite, but the North might also get desperate and invade the South. START II may go through, but the Russian Duma appears to be in no hurry on ratification.<sup>325</sup>

Now consider the list of countries with the potential to attain nuclear capabilities by, to pick a date, December, 2006: Iran, Brazil, Taiwan, Syria, Argentina, South Korea, Libya, Egypt, and Algeria.

This grouping assumes that South Korea decides to counter the North, possibly to create a state of détente in the face of a North Korean invasion and a vastly reduced U.S. military presence. Taiwan, upset by Beijing’s handling of Hong Kong after 1997, wants to ensure China stays on its side of the strait.<sup>326</sup> This listing also assumes that all Middle Eastern states pursuing nuclear weapons are successful, except for Iraq, which is still subject to international monitoring.<sup>327</sup> Brazil and Argentina both gave up their nuclear

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323. However, such a reduction may lead to other problems since dismantling large numbers of weapons leads to more fissile material in transit or storage.

324. See Seymour M. Hersh, *On the Nuclear Edge*, NEW YORKER, Mar. 29, 1993, at 56, 65.

325. See Sublette, *supra* note 98, at 7.1.

326. South Korea and Taiwan have actually pursued nuclear weapons, but both stopped after intense U.S. pressure, and presumably security guarantees. See *id.* at 7.4.5; 7.4.8. The American nuclear umbrella was probably both safer and cheaper.

327. This is an assumption in ten years time. Barring a drastic change in leadership, Iraq could get the bomb in the next decade if the international community’s desire for Iraqi oil leads to relaxed monitoring.

projects, but if Brazil has indeed restarted its program, Argentina will surely follow suit.

As bad as it looks, this list could be worse. As noted, Iraq was left off. Japan could go nuclear given the changes in the Asian security structure.<sup>328</sup> The general scope of proliferation and the accompanying spread of missile technology might encourage more European powers to go nuclear, especially if the United States further withdraws from Europe, NATO expansion plans collapse, or Russia reverts to its old ways.<sup>329</sup>

Given the fall of the Soviet Empire and recent fiascos in Bosnia, Somalia, and Rwanda, perceptions about American security guarantees may have changed. If a country believes that such guarantees are diminished, the nuclear umbrella may no longer be a good bet. And that could mean further proliferation.

In any event, the suggested 2006 listing is double that of today's membership. Political stability is a key factor in proliferation and the state sponsorship of terrorism. If Egypt develops a nuclear weapon and falls to an Islamic fundamentalist government, an increasingly likely scenario given the weakness of the Mubarak regime,<sup>330</sup> the potential for mischief grows substantially. Therefore, the United States must work to ensure that countries with nuclear weapons remain stable. How safe would a nuclear component be in Egypt? In Algeria? With such instability, corruption, and poor security, the answer is obvious. And state sponsorship takes on whole new meanings when the sponsor is nuclear-capable. Thus, if proliferation is not curbed, the risks of nuclear terror will increase dramatically.

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328. One could argue that Japan would never go nuclear, because of Hiroshima and Nagasaki. But the new generation of leaders was born too late to remember World War II, and many want a permanent seat for Japan on the U.N. Security Council. See, e.g., Edward Mortimer, *Culture Clash: A New Book on the Decline of the West's Influence Fails to Give Due Weight to the Endurance of its Civilization*, FIN. TIMES (London), Jan. 15, 1997, Comment & Analysis, at 26; see also Edward Mortimer, *Security in Numbers: Expansion of the Security Council is Fraught With Problems But Desirable Given US Indifference to the UN*, FIN. TIMES (USA), Aug. 27, 1997, Comment & Analysis, at 8. The five current permanent members have nuclear weapons, so why not Japan?

329. If NATO expansion does not go through, some states in Eastern Europe may want to go nuclear. Indeed, the Baltics will likely be left out of any NATO expansion in the near future. See, e.g., Charles Clover, *Lebed warns on Nato expansion*, FIN. TIMES (USA), Oct. 7, 1997, News Europe, at 3. Therefore, they might want a deterrent. Would Russia invade to shut down a Baltic bomb project?

330. See DUNNIGAN AND BAY, *supra* note 6, at 93.

#### D. The New Deterrence and a Comprehensive Policy

A credible deterrent posture could go a long way toward preventing nuclear terror, at least in dealing with "rational" actors.<sup>331</sup> If terrorists and state sponsors become convinced that they will not get away with an act of nuclear terror, they might at least think twice. Creating a credible deterrent will require a multi-phased policy.

First, of course, is intelligence. The United States must attempt to obtain every piece of information available concerning proliferation, loose nukes, which scientists are working where, what fissile material supplies are vulnerable, and which terrorist organizations are shopping for atomic weapons. Help from Israel, Russia, and other countries will be invaluable. Thus, Washington should lean on those governments to supply what they know, in exchange for our own intelligence, money, or anything else that will grease the wheels.

The United States should also pursue a comprehensive agreement with other nuclear weapons powers to mark each warhead with unique isotope mixtures or other characteristics that can be used to identify bombs by country of origin.<sup>332</sup> GPS tracking and self-destruct features should also be added. Washington should sell this plan by emphasizing its value in avoiding false accusations in the event of nuclear terror, while also suggesting that Moscow, Tel Aviv, New Delhi, and Paris could all very easily be targeted by atomic terrorists.

Third, the United States must have a retaliatory policy modeled after the flexible response doctrine.<sup>333</sup> Thus, in the event terrorists

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331. Again, there is the problem of organizations whose members do not care if they are killed as a result of their terrorist activities.

332. Perhaps the isotope ratios should be held in some sort of escrow system with the IAEA or otherwise kept secret, as the system could be abused. For example, Iran might build a bomb with another country's fissile material tags and set it off, hoping to avoid culpability.

333. The doctrine of flexible response is a concept "that NATO should be able to deter, and if necessary to counter, military aggression at any level . . . . Flexible response requires a balanced combination of both nuclear and conventional forces. These forces must be sufficient to deter aggression and, should deterrence fail, be capable of direct defense, including escalation under political control, to the level of response necessary to convince the aggressor of the defender's determination and ability to resist, thus persuading him to cease the attack and withdraw. An aggressor must be therefore be convinced of NATO's readiness to use nuclear weapons if necessary, but he must be uncertain regarding the timing or the circumstances in which they would be used." NATO INFORMATION SERVICE, *THE NORTH ATLANTIC TREATY ORGANIZATION: FACTS AND FIGURES 217* (1989); see generally GREGORY SHAUN, *NUCLEAR COMMAND AND CONTROL IN NATO: NUCLEAR WEAPONS OPERATIONS AND THE STRATEGY OF FLEXIBLE RESPONSE* (1996).

detonate a nuclear device in the United States or against some other American target, the United States will respond in a manner of its choosing. This may be nuclear retaliation, conventional bombing, both or neither.<sup>334</sup> It could involve a military invasion to strip a state-sponsor of its entire WMD<sup>335</sup> infrastructure. If the attack was without state sponsorship, it might involve special forces, kidnappings, and hit teams. Washington must make clear that nuclear terrorists will not be safe anywhere—and that countries harboring nuclear terrorists will pay.

Numerous, more legally-oriented approaches might look appealing: making nuclear terrorism a crime against humanity, creating a permanent international criminal court, or negotiating treaties on sharing intelligence and extraditing terrorists. But these measures do not really address the threat. Stronger measures will be called for, and probably deemed acceptable, by the American people. Tolerance of casualties and intervention in the affairs of other countries will not be bothersome to the average citizen who will be more concerned about when and where the next bomb might explode.

The deterrent policy should also apply to attempts. If NEST was lucky enough to find and disable a bomb before it detonated, this should not absolve the perpetrators. They must be found and punished before they get a chance to try again. Once the international community sees how the United States responds, others wishing harm to America will be given pause.

Certainly, a strengthened NPT regime is desirable, as is a complete ban on fissile material production. But these sorts of policy solutions take time to implement. Given the amount of fissile material in circulation, halting plutonium production will not save America,<sup>336</sup> and strengthening a legal regime means little to countries which do not play by the rules. Averting incidents of nuclear terror will take stronger measures—even some unpopular ones.

## VII. CONCLUSION

Congressman Richard Gephardt provides this wakeup call on the subject of nuclear terrorism:

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334. See Dunn, *supra* note 138, at 44.

335. WMD is shorthand for weapons of mass destruction, which encompasses nuclear, chemical, and biological weapons.

336. See BOWMAN, *supra* note 290, at 194.

Anybody who thinks nuclear terrorism can't become a reality hasn't faced reality. Anybody who thinks terrorists can't acquire the technical knowledge to build an atom bomb hasn't picked up your average encyclopedia or talked to a college physics major.

Anybody who thinks terrorists aren't cunning or ruthless enough to pull off a nuclear attack has forgotten the Munich Olympics, the showdown at Entebbe, or the shooting of the Pope. Anybody who thinks an outlaw country won't help terrorists "go nuclear" hasn't been to Teheran or Tripoli.<sup>337</sup>

Some will deny the threat. They accept that some states and groups might be inclined to resort to nuclear weapons, that nuclear materials are less secure than they used to be, and that it is easier to build a bomb now than it was in the 1940s. But they argue that it will never happen, otherwise we would have already seen an act of nuclear terror.<sup>338</sup> However, it is not really known whether or not there have in fact already been such attempts. Any legitimate threat or attempt successfully averted would have been kept very quiet to avoid creating a panic. Therefore, the general public may not learn of a nuclear incident unless it succeeds.

Simply put, one cannot predict the actual probability of nuclear terror because there are too many unknowns. No one is sure how much fissile material is in the wrong hands. No one knows for certain that operable Russian weapons have not been sold or stolen. No one can be safe in the assumption that terrorists will not cross the nuclear threshold. Because of these uncertainties, the United States must prepare itself for the worst.

Some day, people across this country could wake up, turn on CNN, and see the big mushroom cloud in the sky. And the United States would never be the same. An act of nuclear terror would not only have significant impact in terms of loss of life and economic harm, but the psychological damage would be substantial. Because of its geography, America is in many ways sheltered from much of the madness that currently reigns in certain regions of the world. A single nuclear detonation would shake the confidence of the American people and disabuse the population of the notion that their government can protect them. There could be calls for expanded police powers, curbs on immigration, and, possibly, even suspension of civil liberties in order to ensure national security. Many countries do not enjoy the same freedoms taken for granted by Americans

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337. Richard A. Gephardt, *The New Nightmare of Nuclear Terrorism*, in NUCLEAR TERRORISM 144, 145 (Paul Leventhal & Yonah Alexander eds., 1986).

338. See generally Kamp, *supra* note 8.

because those countries do not have the same degree of safety and security. And that is the true nature of a national security breach—when an external threat jeopardizes a nation's very way of life. If this problem is not adequately addressed, the United States might end up swimming in that pool of hydrochloric acid, with its legs cut off.

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